THE
ELECTRICAL REVIEW

Volume CXXIX **No. 3339**

Friday, November 21, 1941

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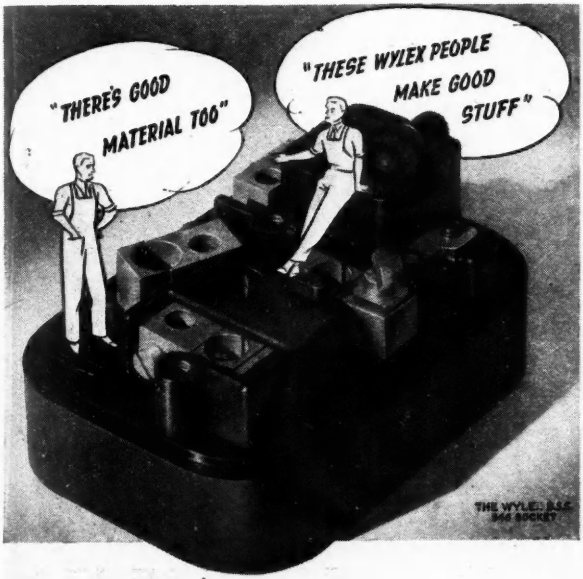
EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1

Telegraphic Address: "Ageekay, Sedist, London." Code: A B C. Telephone No.: Waterloo 3333 (35 lines)
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £1 14s. 8d. per annum.

Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank"



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THE
ELECTRICAL REVIEW
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Vol. CXXIX. No. 3339. NOVEMBER 21, 1941 6d. WEEKLY

Wartime Installations

Simplification, Substitution and Standardisation

A REASONABLE factor of safety to minimise risk from shock and fire and ensure freedom from breakdown throughout the designed life of the wiring and apparatus, together with a layout that facilitates extensions, are the main requirements for sound installation work. How far can the electrical industry go toward paring away the available margin as a contribution towards "siege economics"—that is, towards conserving material, labour and machines—and yet retain the essential qualities in an installation designed to last only for the war period?

The foregoing briefly represents the question posed to the electrical industry at the informal discussion opened by Mr. G. S. Ramsey at the I.E.E. Installations Section (which has thus already justified its existence). It is indeed a sign of the times that the chief engineer of the Ministry of Works and Buildings, which has earned a reputation for strict insistence on work of the highest class, should initiate a campaign of this kind.

By this method of treating the subject under three alliterative headings, viz.:—Simplification, Substitution and Standardisation, Mr. Ramsey has reduced the problem to manageable proportions. Regarding the first of the "S trinity," there is much to be said at any time for getting rid of superfluities; even on æsthetic grounds the nearer we keep to the purely functional the better, while the use of a minimum of material is in the line of true engineering progress.

We doubt whether substitution holds out much promise at the present time. It would no doubt involve spending time on research, when the need is immediate, of allocating more plant than can be spared to working up existing materials, which may, moreover, run short. However the suggestion that installations should be all-insulated is of immediate value in regard to the saving of metal as well as on safety grounds. Mr. Ramsey urged manufacturers to confine their attention to those designs that can be most easily, cheaply and quickly produced and to adopt a more ruthless standardisation. As Mr. S. W. Melsom put it trenchantly in his address as chairman of the Transmission Section, when advocating a reduction in the number of prevailing standards, what may be merely uneconomical in peace becomes criminal folly in war.

Much has been done already by manufacturers towards meeting the conditions. Upon the designers of installations falls the onus of keeping in touch with all that has been or is being put on the market for the purpose. Many examples have been described in our columns, but we hope shortly to publish a survey of what is available for their assistance.

In deciding the average life of a wartime installation allowance has to be made for the possibility of shortage of material for some time after the war, and also for the tendency of temporary work to become a permanent fixture.

While the I.E.E. Regulations relate

primarily to methods and materials of recognised reliability, they also allow for the use of new developments if these can be shown to be not less safe. It may be that the re-examination of existing practice resulting from war stringency will lead to a reduction in the factors of safety that have been hitherto regarded as irreducible. If so the present striving for economy will be of permanent value.

Regional Power Control

SOME months ago a Fuel and Lighting Order was made by which the arrangements for the supply and use of fuel in the Civil Defence Regions were placed under the jurisdiction of the Controllers. Now the appointment of regional fuel and power controllers to act under the direction of the Regional Controllers is announced. From our point of view the most interesting of the appointments is that of Col. J. C. Dalton, who is to take charge of the London and South-Eastern Region—in a number of respects the most important. Col. Dalton has devoted much time in recent months to fuel supply questions and a better choice could not have been made.

Factory Maintenance

WE drew attention in our issue of October 31st to the importance of ensuring that electrical maintenance engineers were fully employed, which we had been assured was not always the case. Mr. A. Brammer, general secretary of the Association of Supervising Electrical Engineers, tells us that the general experience of his members is that there is quite enough for them to do—in fact, many of them are overworked. We are glad to hear this (that they are fully occupied, not that they are overworked, of course). Our original informant did not suggest that the slackness he mentioned was general, but that there was sufficient of it in some districts to justify investigation.

Coal Handling

AN appreciable component of the total cost of coal fired consists of terminal charges on the power station site. These may vary widely from station to station as in the case of fourteen examples cited in *Power*, where the overall figures ranged from about 8d. to 4s. per ton. The controlling factor is the effect on the capital charges per ton of the load factor at which the coal-handling plant is worked. Maintenance and operating labour do not loom largely, relatively speaking, and are sometimes below the average when overall costs are highest.

Camouflage Hints

THE Aeronautical Correspondent of *The Times* recently quoted some advice on camouflage from Italian A.R.P. handbooks. Among other things it is pointed out that overhead power line standards "can be neatly turned into the arches of a Roman aqueduct, standing in picturesque ruin across an innocent countryside." Again, "an oil storage tank makes a passable villa in Italian style, with shuttered windows." False railway works should have adjoining them lengths of line with switch points, and these should be lit with flashes to represent the passage of electric trains.

Lease-Lend and Exports

IT was stressed in our leading article of October 24th, that it was impossible for us to export goods containing materials of the kinds being supplied to us under the "Lease-Lend" agreement unless these were definitely connected with the prosecution of the war. In this view we have the backing of the Prime Minister who told the National Union of Manufacturers that the restrictions upon our export trade were not made merely in deference to the United States. We could not escape necessary sacrifices even in our export trade while the United States was willing to stint its own citizens in order that we might be able to prosecute the war effectively. After all without American aid we cannot win the war and what would happen to our export trade if we lost it?

Free as Air

IT is pleasing to see that the war has not put a stop to the flow of ingenuity from young inventors. This time the idea comes from Vichy where a young electrician has devised apparatus for capturing atmospheric electricity for domestic use. According to *Reuter* he has succeeded in picking up electricity for lighting his house and running installations used in his work. We can almost believe it; sometimes our superhet. set picks up enough in the course of an evening to run a factory—it only needs tapping off. But we are keeping on the mains *pro tem.*

Lamps in Photography

A Survey of the Principal Types

By T. Thorne Baker,
F.Inst.P., A.M.I.E.E.

The characteristics of different lamps in use in photography are described, with an indication of recent developments in design

PHOTOGRAPHY in some form or other is employed in practically every industry. Much of the work is done in commercial studios, or in the photographic departments of big organisations, which utilise artificial light largely because of its convenience and partly because the fluctuations inherent in daylight make uniform work difficult. It hast hus come about that a large variety of lamps has been produced purely for photographic purposes. More are being evolved as the ramifications of photography extend.

The types most largely used include concentrated filament lamps for projection, over-run lamps for studio work, and flashbulbs which emit light of considerable intensity during a small fraction of a second. High- and low-pressure mercury vapour lamps, high- and low-intensity arcs, fluorescent vapour lamps and, more recently, lamps rich in infra-red radiation for both actual photography and for processing purposes, may be added. Incandescent lamps may range from 500 to upwards of 5,000 W; cinematography still depends in general on a mixture of arc and incandescent lamps, or "inkies" as the latter are familiarly known in the studios.

The main problem that has faced the lamp manufacturer in dealing with this now extensive field is the difference between the spectral response of the photographic film and the spectral distribution of the light source. Assuming the visible spectrum to extend from the near ultra-violet at a wavelength of about 380 millimicrons, the sensitivity of an ordinary silver halide emulsion (with which film is coated) is indicated by curve A (fig. 1) with the maximum in the blue-violet and tailing off to zero just beyond 500 in the blue-green. Curve B represents the relative intensity of light emitted from an average incandescent lamp, lowest in the blue-violet, rising steadily in value through the green region right beyond the end of the visible red.

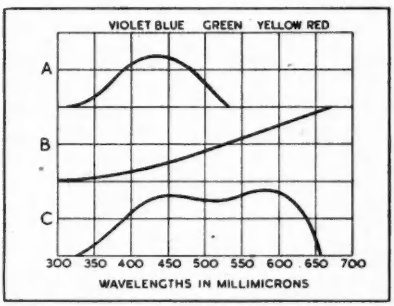


Fig. 1.—Curves differentiating between spectral response of photographic film and spectral distribution of light source

The lamp manufacturers, by over-running lamps at the expense of their life (some of the "whitest" photographic lamps have an average life of two hours only) have considerably raised the relative output of violet and blue rays. The film manufacturers have rendered their emulsions, on the other hand, sensitive to green, yellow and red until the spectral response has become that shown by curve C (fig. 1). In tungsten light the red-sensitiveness is actually in excess of the blue, which panchromatisation stops somewhat abruptly at a wavelength of about 650 mμ. This practice is dictated by the fact that, except for infra-red photography, the amount of red sensitiveness is adequate for all practical purposes, including natural colour photography, and provides working safety, incidentally avoiding the tendency of most dyes used in filter making to transmit the deep red.

Curve C indicates that the panchromatic film absorbs a greater proportion of the total spectrum area than the plain emulsion A. The extra light energy absorbed has added greatly to the practical speed when used in incandescent light. By means of so-called hypersensitisers the total speed has been again increased recently, *several times*, so that the fastest films as made to-day are five to ten times faster than they were ten years ago. This fact has not lessened, as might be thought, the demand for brilliant electric lamps. Neither does the photographer care particularly about economy, as is shown by the large-scale use of over-run lamps with a life of only a few hours. In commercial studios where economy must be considered, a compromise has been effected by the production of lamps which give a whiter (less red) illumination than ordinary gas-filled incandescents, but which have a reasonably long life such as 200 hours.

Photographic illumination has been stand-

ardised in recent years on a colour temperature basis, more especially since the advent of photography in natural colours. No matter in what light a colour picture is taken, it is the accepted ruling that the subject should appear in the photograph as if it were being seen in noon sunlight at Washington. The relation between daylight and the various lamps is shown in Table I.

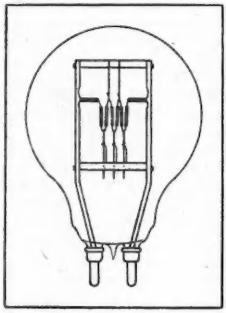


Fig. 2.—Bipost projector lamp

The flashbulb not only simulates sunlight in colour temperature but by its luminous output has opened up entirely new fields in commercial photography. One ordinary sized flashbulb the size of a 75-W incandescent lamp is equal approximately in brightness to 520 photofloods, and is capable of a light intensity of a million lumens upwards. Entirely new developments have recently taken place in the design of flashbulbs which will have an important influence on high-speed engineering photography.

The "Osram" 275-W photoflood lamp fits the standard socket and is the size of a 60-W lamp. With a life of two hours, it suffices on the average for 300 studio exposures or the exposure of 2,000 ft. of cine film. By using ordinary lamps for preliminary focusing, the special lamps need only be switched on for the actual exposure, and the short life thereby economised. Two photofloods placed 4 ft. from the subject, with good reflectors, admit of exposures of 1/25th second with a lens working at f/4.5. Snapshot portraiture indoors has thus been made entirely practicable. Pearl lamps for commercial studio lighting are made in the 500-W size, 175 mm. long and 100 mm. in diameter; they are not so highly over-run and have a life of 100 hours.

Table I

SOURCE	COLOUR TEMPERATURE
Sun	5,400 deg. K.
Sky	10,000 to 25,000
Nernst filament	2,400
Ordinary tungsten lamp	2,780
Large studio lamps	3,200
Photoflood lamps	3,500
Ordinary cored carbon arc	4,000
Photoflash lamps	5,000 upwards

For cine studio lighting lamps of 2,000, 3,000 and 5,000 W are made with their filaments mounted so that they can be run at an angle if desired. They are of the grid-filament type; the area of the grid of the 5,000-W lamp is 35 by 25 mm. It frequently happens that arc lamps, operated from a comparative distance, are used in conjunction with over-run reflector units which may take the form of three or four rows of 1,500-W incandescent lamps with a sheet aluminium reflector fitted with a ball bearing fan for cooling at one side.

In the lighting of a set in a commercial or cine studio apart from general illumination it is necessary to direct more or less coned beams upon certain high spots, and various types of spotlight lamps have been designed for the purpose. A typical light source of this kind is the 2-kW projector of the G.E.C., which may be mounted on a tripod, or by means of a clamp may be fixed to the spot-rail at the top of a set. An interesting unit is a 2-kW lamp housed in a body built up of aluminium castings which is backed by a spheroidal mirror with focusing screws to ensure accurate alignment. A 12-in. square lens is fitted in front of the lamp, with which an even floodlight 12 ft. in diameter can, if desired, be thrown at a distance of only 10 ft. An "Osram" bipost projector lamp (fig. 2) can also be used in a housing of similar design, fitted with a 16 in. square prismatic plate lens.

It is unnecessary here to go into details of the actual lamp construction, but mention should be made of the circular "black" prismatic lenses used in certain G.E.C. studio illuminators, which give a maximum intensity in the spot position, the "risers" of the back prisms being blacked out to eliminate any spill due to internal reflection. The distribution on a screen 10 ft. from a 2-kW projector is seen in fig. 3. Considerable diversity in the

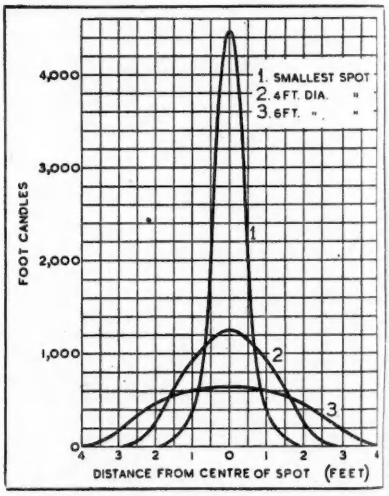


Fig. 3.—Light distribution on screen 10 ft. from 2-kW projector

design of filaments is apparent in the late types of projection lamps, the staggered grid, biplane grid and twin-pillar coiled filament being noticeable features.

The photoflash bulbs already referred to, known more familiarly in this country as "Sashalites," contain very thin aluminium leaf and oxygen gas. An inflammable composition is applied to a small tungsten filament through which current is passed from a small dry battery, rendering it incandescent and thereby igniting the leaf. There is a time lag in the lamps due to the interval between closure of the local electric circuit and the peak of the illumination. This varied in earlier flashbulbs from 0.013 to 0.020 second, but has since been more or less standardised.

Much attention has been paid to synchronising the peak of the flash with the camera exposure. Focal plane shutters operate by the traversal of a slit of preset width across the film or plate, and while the actual exposure of the film surface may be, say, 1/1000th sec. the time of traversal of the slit is appreciably longer. A shredded foil flashbulb has been recently introduced to meet the case, the duration of the flash being approximately 0.03 second, light output 16,000 to 18,000 lumens and 500,000 peak lumens.

In the ordinary way, owing to the mechanical lag of the shutter, the duration of the flash may have a peak light length of 1/25th sec., but peak lengths of only 1/90th sec. are available. The long flashbulb has been designed specially for use with "speed guns," and covers any mechanical lag which the camera may have when working at speeds between 1/500th and 1/2,000th of a second.

The introduction of a tangle of intensely fine aluminium alloy, or hydronalium, in place of the leaf has found considerable application in American flashlamps. The "wire" lamp burns with a less intense light and more slowly. Unfortunately the light emitted by the different types as regards spectral quality varies sufficiently to upset the accuracy of colour rendering with natural colour films, and requires correction by means of selective light filters.

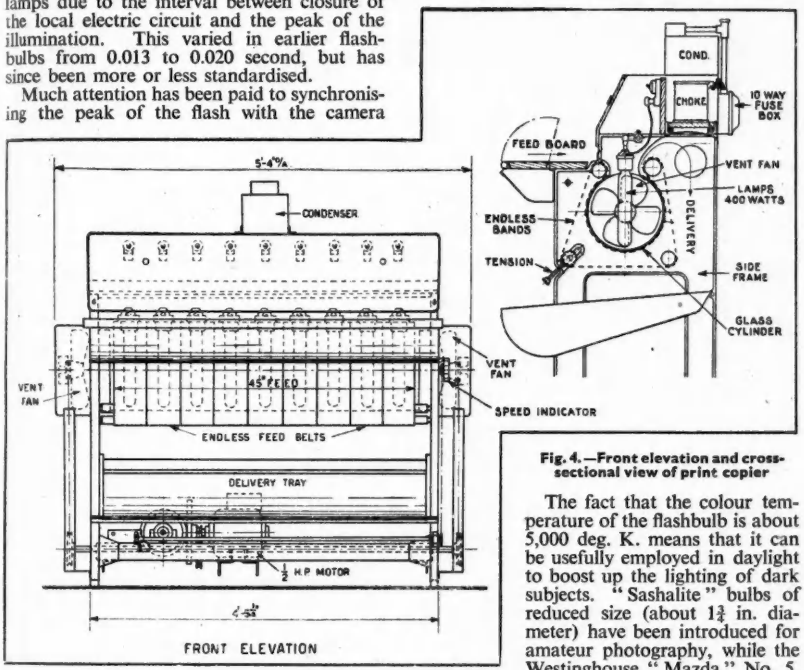


Fig. 4.—Front elevation and cross-sectional view of print copier

The fact that the colour temperature of the flashbulb is about 5,000 deg. K. means that it can be usefully employed in daylight to boost up the lighting of dark subjects. "Sashalite" bulbs of reduced size (about 1¾ in. diameter) have been introduced for amateur photography, while the Westinghouse "Mazda" No. 5, "the size of a golf ball," is claimed to have a peak illumination of a million lumens. The Wabash lamp is provided with a blue spot on the bulb which will turn pink should it develop imperfections and become unusable.

Mercury vapour lamps have been employed in the photographic industry for many years; the unpleasant appearance of the human skin in their characteristic green light at reduced vapour pressure did not favour their use in the portrait studio, but for photo-mechanical work, copying and printing machines, they have enjoyed wide application. The newer types include high-pressure lamps having a glass inner envelope, 250- and 400-W, and 80- and 125-W with a quartz inner envelope; low-pressure lamps of the tubular hot-cathode

type have also been introduced for special purposes.

The photographic efficiency of the high-pressure types varies naturally with the spectral response of particular printing processes. H. J. A. Turner states (*G.E.C. Journal*, X, 2, 1939), that the 400-W "Osira" lamp is as effective as the arc with ferroprussiate (blue-print) papers, though only about half as effective with the newer azo-dye papers. A continuous copying machine in which nine 400-W high-pressure mercury vapour lamps are used in line on a 45-in. printer (motor-driven "Victory" copier) giving a total of 162,000 lumens (diagram in fig. 4) has a separate choke for each lamp, and a fan is fitted at each end of the glass printing cylinder for cooling purposes. Lamps of this type are also used in daylight printing establishments to boost up the light in dull weather.

By adopting still higher pressures not only is the candle-power per square centimetre output increased, but the colour becomes much whiter and more resembling daylight, the characteristic line spectrum fading out and the continuous background predominating.

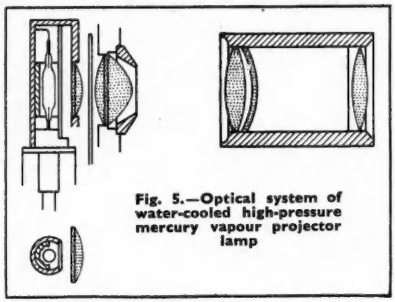


Fig. 5.—Optical system of water-cooled high-pressure mercury vapour projector lamp

The very small size of such high-pressure lamps makes them especially suitable for projection work. Mercury vapour at a pressure of 100 atmospheres fills a tube less than ¼ in. in diameter with a discharge length of half an inch. It is thus almost a "point" source. At 500 V 2 A is passed through the tube, and the heat emitted is dissipated by water cooling. Operating at an efficiency of about 60 lumens per watt, the high-pressure mercury vapour lamp is capable of a brightness of 57,000 c.p. per sq. cm., as compared with, say, 4,000 in the case of a filament lamp. The optical system of a water-cooled lamp is seen in fig. 5, reproduced from the *Students' Quarterly Journal* of the I.E.E. for September, 1939.

Considerable research is in progress with a view to adapting this type of lamp to full-size cine projectors, but so far the high-intensity arc may be said to hold the entire field. The construction of cine projection arcs has undergone many notable improvements discussion of which must be reserved for a future occasion.

NEW BOOKS

A Dictionary of Electrical Terms. By S. R. Roget. Pp. 432. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 12s. 6d.

Though the fourth edition of this much-used book has been revised and enlarged, thinner paper has reduced its bulk. But there never has been any clumsiness, since the subject-matter is strictly confined to the electrical side. For example, the purely mechanical features of electrical plant are not included, neither are "traffic" terms in telegraphy and telephony dealt with. Much space has also been saved by a liberal use of italics, inviting reference to other entries. The addition of fresh terms has been proceeded with and there has been substantial modernisation of phraseology, though it has not been considered advisable to delete old-fashioned terms that are still met with.—W.O.F.

Radio Upkeep and Repairs for Amateurs. By Alfred T. Witts, A.M.I.E.E. Fifth edition. Pp. 217; figs. 136. Sir Isaac Pitman & Sons, Ltd., Price 6s. 6d. net.

This book, which was originally intended to help the amateur to deal with many of the faults likely to occur in his radio receiver, and so avoid the necessity of calling in a service engineer for trivial faults, is particularly appropriate at the present time in view of the scarcity of service engineers. Despite its title, however, the book deals with the subject in sufficient detail to make it useful to the service engineer himself, not to mention the many men who are serving in the Forces as radio mechanics, etc.

The new edition has its first chapter re-written under the title "Test Equipment: How to Make and Use", and this gives useful information on extending the range of milliammeters, constructing a multi-range milliammeter, voltmeter and ohmmeter, making an AC voltmeter, a resistance box and a capacity box. A re-written chapter on "Mains Receivers: Design Notes" is intended to help in the construction of a new receiver (rather difficult at the present time) or in modifying an old one.

The book deals with the testing, location and repair of faults in complete receivers and components; much information is included on subjects which, while not coming within the ambit of repair work, are nevertheless of interest to anyone wishing to get the best out of his receiver.—W.E.M.

Shorter Notice

The Behaviour of Slow Electrons in Gases. By R. H. Healey and J. W. Reed. Pp. 179; figs. 39. Amalgamated Wireless (Australasia), Ltd., Sydney. Distributed in Great Britain by the *Wireless World*, Dorset House, Stamford Street, London, S.E.1. Price 20s.

PERSONAL and SOCIAL

News of Men and Women of the Industry

A SPECIAL luncheon was given at the Myllet Arms Hotel, Western Avenue, London, on November 8th, in honour of **Mr. Michael Timmermans'** fifty years' continuous service in the electric lamp industry. Having commenced business on November 8th, 1891, with Goossens-Pope of Venlo, Holland, he came to England in 1904 to help in establishing the Pope Electric Lamp Co., Ltd., here, and remained with this company until 1920, when he held the position of works manager. He continued his service in electric lamp manufacture with his present employers, the Stella Lamp Co., Ltd. (associate company of Philips Lamps, Ltd.). When hostilities broke out in 1939 he was on the point of retiring, but is still in harness at the present time. Presentations were made to Mr. Timmermans by Mr. Rogerson, managing director of the Stella Lamp Co., Ltd. (50 National Savings certificates); by Mr. Aninga, on behalf of Philips Lamps, Ltd. (a gold cigarette case); by the staff and employees of the Stella Lamp Co., Ltd. (a silver tankard); and by Mr. Poldervaart, works manager of Philips' Blackburn Works, Ltd. (a chiming clock).

St. Marylebone Electricity Committee has extended the services of **Mr. F. Selley,** its chief electrical engineer, for one year.

The November *A.E.I. News* contains a brief biography of **Miss Gertrude Entwistle,** who recently succeeded Miss Haslett as president of the Women's Engineering Society. Miss Entwistle has the distinction of being the first woman member of the Institution of Electrical Engineers; she became a graduate in 1919 and was elected an associate member in the following year. She has also been a member of the Electrical Association of Women from its inception and was on the Executive Committee during its early years. She founded the Manchester branch of the E.A.W. and became its first secretary.

Miss G. Entwistle

Miss Entwistle joined the Metropolitan-Vickers Electrical Co. in 1915. At the first conference of the Women's Engineering Society in 1923 she read a paper on "Some Considerations of Commercial Electrical Designs."

Ald. Sir Thomas Higham, who recently resigned from the office of chairman of the Accrington Electricity Committee as a protest against the Committee's refusal to agree to the standard of salaries fixed by the National Joint Committee of Local Authorities and Chief Electrical Engineers, has resumed the office, and is therefore continuing duties he has discharged for thirty-six years.

Dr. Arthur Surveyer and **Mr. M. W. Wilson** have been appointed directors of the Shawinigan Water & Power Co., to fill vacancies caused by the deaths of Senator L. C. L'Esperance and Sir Herbert Holt. Dr. Surveyer is a well known consulting engineer in Montreal and is a past president of the Engineering Institute of Canada. Mr. Wilson, who is president of the Royal Bank of Canada, and a director of a number of other large Canadian companies, is at present serving as chairman of the British Supply Council in Washington.

The paper on "The Characteristics and Performance in Service of High-voltage Porcelain Insulators" by **Mr. J. S. Forrest,** M.A., B.Sc.

Mr. J. S. Forrest

summarised on another page, was awarded the Coopers Hill War Memorial Prize and Medal by the Council of the I.E.E. Our photograph shows the author "on the job" using a testing stick on a high-voltage line.

Mr. Wm. A. Gallon, B.Sc., M.I.E.E., assistant borough electrical engineer, Southampton, whose appointment to the position of borough electrical engineer at Woolwich was announced briefly in our last week's issue, was educated at Rutherford College, Newcastle-on-Tyne. His technical training was interrupted between 1915 and 1919 by war service in France, Salonika and Russia as lieutenant in the Machine Gun Corps. He was twice wounded.

Resuming his studies at Armstrong College and Durham University, he graduated B.Sc. in applied science in 1921, and then took up an appointment, which he held for seven years, as technical assistant in the testing department of the Newcastle Electric Supply Co. In 1928 he became senior assistant electrical engineer to Imperial Chemical Industries, Ltd., Billingham-on-Tees, leaving this company in 1935 to become chief assistant electrical engineer to the Plymouth Corporation. He went to Southampton in 1938. Mr. Gallon was hon. secretary of the Tees-side Sub-centre of the Institution of Electrical Engineers for many years and served as chairman in 1932. He was

also hon. secretary of the Devon and Cornwall Sub-centre from its inception until 1938; he is on the committee of the Hampshire Sub-centre.

Last week we reported the appointment of **Mr. G. H. Byron** as lamp superintendent for the Metropolitan - Vickers Electrical Co., Ltd., in Birmingham, and we are now able to reproduce a recent portrait of Mr. Byron.

Mr. G. H. Byron

In recognition of his services in connection with negotiations between the South Wales and Monmouthshire Supply Association and the South Wales Power Co., under which the Tredegar Urban District Council received credits for £3,000, **Mr. William Davies,** the Council's engineer and manager, has been presented by the Council with a number of technical books. A presentation has also been made on behalf of the staff, and a grandfather clock has been presented to him by Mr. E. W. Jones, general manager of the Mountain Ash Electricity Department, on behalf of the Supply Association.

Obituary

Mr. G. H. Ide.—We regret to record the death of Mr. G. H. Ide on Monday, November 10th, at his home at King's Norton, nr. Birmingham. Mr. Ide was in his 81st year and was a director of the General Electric Co., Ltd., from 1915 until his retirement in 1940. He joined the company in 1897 and started in that year the electric light fittings works in Great Hampton St., Birmingham, which were later transferred to Sherlock Street and then to Wheeley's Lane.

He also took an active interest in establishing the Engineering Works at Witton in 1901. From the time Magnet Works were established in 1928 until 1940, when he retired, Mr. Ide was the responsible director for this important section of the company's activities. He leaves a widow but no children.

Mr. C. H. Laws, a director of Laws & Burns, Ltd., electricians, South Shields, has died suddenly at the age of fifty-three. He had been in business for over thirty years.

Will.—Mr. C. S. Richards, joint managing director of the Metropolitan-Vickers Electrical Export Co., Ltd., left £27,957, with net personalty £6,247.

Proposed Ulster Unification

(From our Belfast Correspondent)

A SPECIAL meeting of the Belfast Electricity Committee was held on November 11th, to consider the financial aspects of the Government's proposal to merge—for the duration of the war anyway—the Corporation electricity undertaking with those of Londonderry and Larne, Co. Antrim. Under the scheme a new body, to be known as the Electricity Authority, would be set up under the supervision of the Ministry of Commerce, and it would consist of seven members—four representatives of Belfast Corporation, one each for Londonderry and Larne and a representative of the Ministry.

There was a good deal of opposition to the proposal and the meeting adjourned until this week to enable fuller consideration to be given to the financial position. The city treasurer presented a statement showing that the assets of the undertaking, after deduction of all liabilites, totalled £2,648,372. At March 31st last the reserve fund was £88,149, and the undertaking also held £11,000 Belfast Corporation stock. In the final computation of the Corporation's liability to income-tax, surpluses of taxed income of the trading undertakings were brought into account and set off against the liability of the city fund. For the year ended March 31st last the surplus available from the electricity undertaking amounted to £53,055, and that amount at the current rate of tax, represented a saving to the city fund of £26,527. That saving would be lost if the undertaking ceased to belong to the Corporation. The average annual contribution made by the undertaking for the past ten years towards the relief of rates was £17,600.

It is believed that the basis of the proposed merger is not that the Government will take over the Corporation undertaking but that it will enter into partnership with the Corporation, assigning to the latter the major interest in the partnership. As all liabilities of the Corporation undertaking are being assumed and the annual sum realised from it for the relief of rates is being safeguarded by a statutory annual payment from the Electricity Authority to the Corporation, the question of a compensation payment does not essentially arise. The Corporation would lose control of the undertaking to the extent that the proposed new statutory body would be responsible to the Government instead of to Belfast Corporation, but the Government has given the Corporation majority representation. In these essentials the scheme is that proposed by the Corporation negotiating sub-committee to the Government and has been accepted by both parties in principle. The new Electricity Authority, it is proposed, will be responsible for its own finances, with Government backing.

Several members of the Electricity Committee have expressed themselves satisfied with the scheme. Opposition may be crystallised in three main arguments: (1) No compensation would be payable. (2) Charges for light and power would be increased. (3) The loss of the undertaking's revenue would impose an additional burden on the ratepayers.

The Mayor of Londonderry (Senator F. J. Simmons) is reported to have stated that official notification of the proposals had not yet been received, but he thought the scheme as far as Londonderry was concerned was not in the ratepayers' interests. Their undertaking could not be run more economically or efficiently by the Government.

Power Stations in Wartime

Methods of Countering the Effects of Air Attack

By G. V. Harrap,
A.M.I.E.E., A.I.I.A.

EXPERIENCE gained during the past twelve months shows that generating units have withstood bomb splinters and blast remarkably well owing to the sturdy construction of turbine casings and alternator stators, and that a bomb need not be very far away for it to fail in destructive effect. Many undertakings have installed a roofing of sheet-steel over the valve gear, which has proved its value, and fires from lubricating systems have not been the worry that was anticipated. Some machines have been encased in brickwork and concrete and this has been valuable. Heating troubles have not taken place, except around the high-pressure end of the turbine, where additional ventilation has been necessary.

Fabricated condenser shells have withstood shock better than those of cast-iron, and great advantage has been reaped by elaborate sectionalising of steam and water pipework. The duplication of extraction and feed pumps, arranging for alternative steam flows and feed-water control, has proved of great benefit in maintaining running conditions.

In outlining protective measures which have been found most effective under actual air-raid conditions, the author indicates the importance of attending to small points which may easily be overlooked in busy times but can cause trouble

In the boiler house, automatic control systems have been well able to handle the fluctuating load conditions prevalent in times of persistent air-raids. In fact, it may be said that the great stress placed on continuity of supply in peacetime has resulted in a layout and duplication of equipment which has been invaluable in maintaining a similar tradition and good record in the war.

Coal heaps have not caught fire to any disastrous extent, although high-explosive bombs have sometimes scattered them in all directions, thereby causing a certain amount of wastage, but normal need to keep stock heaps at a certain maximum thickness has meant that the loss has not been serious.

Cooling Systems

Concrete cooling towers and concrete ponds have successfully withstood the impact of high-explosive bombs. Damage to wooden cooling towers has at times been serious, since blast may strip the whole of the sheeting from the sides of a number of towers in a group, with consequent reduction in the output of the station even though the rest of the plant is unharmed. Towers of this construction can also be damaged by fire from incendiary bombs and these are sometimes difficult to control.

Stores should be dispersed since their destruction can be exceedingly serious. Steam jointing material, lagging, grate links, high-tensile bolts, etc., are in constant need and a hold-up in supplies may have serious consequences. The principle of dispersal applies to many parts of the power station, not least to the chemist's equipment. Although the station can run all right without the constant checking and testing which is the chemist's duty, yet the destruction of all his apparatus may mean the cessation of such checks and tests for quite a good while, so that the undertaking is not only unable to check the analysis of the coal received but, more important still, cannot control the state of the boiler water.

In the control room, fire protection of cables has already been carried out in most undertakings, but the main trouble has been found to be in damage to the control wiring and cables. It is so essential to reconnect absolutely correctly and the space available is often so limited, that it can be quite a long job to re-obtain remote operation and indication of equipment after damage.

Many items of auxiliary apparatus stand out in the open. As protection from blast, walls made from hollow concrete or breeze blocks, cemented horizontally and filled with sand have been found most successful. A cheaply constructed sloping corrugated-iron roof deflects a certain amount of the lighter debris, though it needs something more substantial to stop the incendiaries, bricks and lumps of stone which often fly about in air-raids.

To provide a more complete protection the walls, which must be not less than 14 in. of brickwork or 18 in. of breeze blocks should be built a little higher than the gear to be protected. A flat concrete roof should then be put over the area, resting on piers built up from the walls and maybe with supporting stanchions inside the area covered, with a space between the top of the wall and the underside of the roof of about 12 in. This space can be covered with a heavy-gauge expanded metal sheeting so as to give ventilation.

In some of the older power stations the

architecture ran to long high windows and slated or tiled timber-framed roofs; the latter often had many dips and valleys in which an incendiary bomb could lodge. On the large spanned roofs, like those of the engine room and boiler house, any major reconstruction is impossible.

Any glazing in the roof should be replaced with some material which will not splinter into death-dealing fragments, like glass—even when wired. Some undertakings have favoured the substitution of glass, slates and tiles by "Durasteel" and, in painting this, have taken the opportunity to do a bit of camouflaging. This can well be applied to all the buildings on the site, as is being done at many stations, but its design is a matter of considerable skill and should be executed by a specialist in that line.

Reverting to roof reconstruction, other undertakings have installed corrugated iron and corrugated asbestos or other type of fire-resistant material in place of the glazing. A prime consideration is the weight which the roof members will stand, but the objectives to be achieved in any modification are two in number. The first is the elimination of anything which might of itself cause injury to staff or damage to apparatus when it is hit by even a small object, such as shrapnel or an incendiary bomb. The second objective is to do away with anything which might catch fire, either from an incendiary bomb lodging on the roof or else a fire inside the building. It is often possible to lay sheets of fire-resistant material in the valleys of the roof, covered with about three inches of sand which does not impose too great an additional weight and certainly not a great bending moment, and is also found to be quite effective.

Concrete Roofing

For the smaller slated or tiled timber roofs, replacement with 6 in. thick flat concrete, covered outside with a 1 in. thick layer of asphalt, is excellent. As to windows it often will be found upon critical examination that many can be eliminated and therefore bricked up. It is important to make sure that the new brickwork is properly keyed into the existing walls and this sometimes involves more time and labour than would be estimated at first glance. Other windows can often have their glass replaced by one of the substantial types of wired-glass substitutes.

At many power stations cranes and telphers are limited in their range. Both must keep to a predetermined track; but in wartime occasions do arise when it is valuable to have a small mobile crane available. Use can be made of it to store coal on any new ground which may either be vacant or be made available by the demolition of property. Such a crane can be invaluable if heavy broken masonry or apparatus has to be removed so as to get machinery going again, or more important still, rescue operatives.

Synchronising equipment cannot easily be improvised, and it is a wise precaution to erect and connect a duplicate equipment in the basement of the switch-house.

Nothing is so disconcerting as the loss of communication, and so it is a wise precaution to put all telephone lines underground in the station yard. Not only should this be done, but the G.P.O. should be approached about the possibilities of running the lines underground throughout the whole length back to the exchange. Most power stations have at least two lines coming in and it is advisable to try to get these put underground by different routes, not only inside the premises but also outside.

Altered Operating Conditions

The problems of wartime are not, however, all bound up with air-raid protection; many alterations have been made in operating conditions too. The latter are, of course, much more variable than those connected with protection of apparatus, and each undertaking will have its own special problems.

Coal supplies are not so consistent as in the past and the variation in quality imposes increased duties on the combustion engineers. More care is necessary not only in discharging the different kinds of coal from the wagons, but also in ensuring either an even spread of the different types throughout the bunkers, or else the allocation of certain types to specified boilers.

Following this, it becomes much more important to ensure proper firing for a number of reasons. It is vital to keep as much plant in commission as possible, so that there shall be the maximum amount of "cover" on the system in case of damage by enemy action to plant in other stations. Secondly, it is essential to keep repairs to grates, brickwork, etc., to a minimum, not only because of the increased cost of materials and the need to keep down costs of generation, but also because of the difficulty in obtaining or retaining skilled men to execute the work. A third reason for economical operation is the desirability of using as little coal as possible because of its continually increasing cost. And last, even if coal were not dear, its delivery is encumbered with so many difficulties, that it is essential to use it sparingly and to conserve as much stock as possible.

Improving Practice

All this not only entails the operation of the plant under its best known operating conditions, but also the investigation of methods of improving present practice. Among those which readily occur to mind are experiments with moisture-addition for the various types of coal, and an investigation into its place of application, *i.e.*, on the conveyors, in the bunkers or into the grate hopper.

Bombing of the distribution network has an

effect in the power station, because any cable fault between the switch-house and the first substation supplied by the feeder will operate the main station switchgear. This will mean an increase in maintenance and calls for good liaison work between the generation and distribution staffs. These increased operations will mean increased duty on the tripping and closing batteries and therefore necessitate more frequent charging and overhaul. This is only a small point, but it can frequently be overlooked in busy times. In fact, wartime conditions do have quite a considerable effect on small matters in the power station; things which were only infrequently done and gear which was only examined now and then, need much more frequent attention because of the changes in operating conditions.

In these times it should be the aim of every undertaking to keep as much plant in commission as possible and to neglect no reasonable steps which will safeguard the equipment from breakdown. Electricity supply engineers do not boast about their achievements, but they do realise that they are an important adjunct to the successful prosecution of the war. By their ingenuity and resource, and by their refusal to be shackled by the usual routine methods and traditions, they perform the important duty of meeting all demands made upon them by wartime conditions.

The following articles which have been published in this journal relate to war conditions in various aspects:—

"Repairing Air-Raid Damage," December 13th, 1940.
"Power in Wartime," by V. A. H. Clements, December 20th, 1940.
"War Damage to Mains," by W. E. Bradshaw, January 10th, 1941.
"Telephone Cables and Bombs," February 7th, 1941.
"Circumventing Raid Damage," February 14th, 1941.
"Salvaging Burnt Plant," May 16th, 1941.
"Renewing Bombed Apparatus," June 6th, 1941.
"Air-Raid Damage," by G. V. Harrap, Oct. 24th, 1941.
"Overcoming Raid Damage," November 7th, 1941.
"Restoring Supply," November 14th, 1941.

Parliamentary News

By our Special Reporter

Coal Situation

IN the House of Commons on November 11th, Mr. Tom Smith asked the Secretary for Mines if he had any statement to make on the present coal situation.

Mr. D. Grenfell said that the steps taken to increase production and to reduce consumption reported last October, had continued throughout the month and they started the winter with distributed stocks appreciably larger than a year ago. But there was no room for complacency; when all possible economies had been made in the consumption of fuel, power and light, our coal needs this winter would still be greater than last winter, and if we were to avoid a repetition of last winter's local shortages we must press steadily on to win more coal and to see that the necessary transport was available to distribute it.

Television

Captain Plugge asked the Minister of Information whether any television experiments had been carried out since the war.

Mr. Brendan Bracken said he was advised that no experiments with the transmission of television had been carried out by the B.B.C. since the war.

Radio Battery Shortage

Mr. Woodburn asked the President of the Board of Trade whether he was aware that whole villages were practically deprived of wireless reception through lack of high-tension batteries; and whether he would arrange with the Secretary of State for Air that the thousands of batteries partly used by the Royal Air Force might be, as they were replaced, made available to the public as second-hand batteries.

Sir Andrew Duncan said that in recent weeks there had been a substantial increase in the production of high-tension batteries, which would in due course reflect itself in retail stocks. Particular attention was being given to the question of supplies for outlying districts. As regarded the second part of the question, he understood that discarded batteries were used for recording and training purposes, but he would discuss the matter further with the Secretary of State for Air.

Scottish Hydro-Electric Plans

Mr. Henderson Stewart asked the Secretary of State for Scotland if he would circulate the personnel and terms of reference of the committee appointed to inquire into hydro-electric development in Scotland.

Mr. Johnson said that the committee consisted of Lord Cooper (Lord Justice Clerk), chairman, Lord Weir, Mr. N. Beaton, Mr. J. A. Cameron, and Mr. J. Williamson. Mr. M. R. McLarty, advocate, would act as secretary. The terms of reference were:

"To consider (*a*) the practicability and desirability of further developments in the use of water power resources for the generation of electricity, and (*b*) by what type of authority or body such developments, if any, should be undertaken and under what conditions, having due regard to the general interests of the local population and to considerations of amenity and to report."

China Exchange Restrictions

ACCORDING to information received by the *Board of Trade Journal*, the Stabilisation Board of China will, at its discretion, provide exchange cover against the following goods imported into Shanghai and Free China:—Electrical machinery for power generation and transmission; prime movers; steam boilers, economisers, mechanical stokers and other boiler-room accessories and parts; other machinery; and radio sets and parts.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Man Power

A REMARKABLE article recently appeared in a prominent Sunday newspaper from which it seems that some half a million men are to be taken from the ranks of industry; these men are to be medically examined and if fit, called up ready for the "spring offensive." Furthermore, they are to be replaced by a similar number of "able bodied men," who are over military age; what these men are at present doing, is not stated.

At the present time there is a shortage of the skilled men who are necessary to maintain the new machinery without which an army of millions cannot exist, for this is a war of mechanical resources. Yet the public are permitted to read such examples of over-statement which to my mind is likely to have an unfortunate effect upon the minds of some people.

It seems that some writers are unable to think in terms of anything less than half a million. It is a pity they are not familiar with industrial conditions and can see what is being accomplished by the small numbers of skilled workers in proportion to the large numbers of semi-skilled and unskilled. As a works electrical engineer I am in a position to say quite definitely that it is not a question of being able-bodied, it is simply a matter of having the right men for the job, and these men are contributing to the national effort just as much as if they were in the Services, perhaps even more, for I know of one fully qualified electrical engineer who is engaged on the changing of batteries in aircraft.

Crewe. HAROLD GREAVES.

"Engineering—Unlimited"

MR. H. E. JOHNSON appears to have a limited knowledge of the services that are available to carry out the work which he mentions. He has overlooked the electrical repair organisations that have been in existence for many years and which have developed to such an extent that scientific methods are applied every day by engineers and workers of long practical experience. My own company is a subsidiary of a leading engineering insurance company so that the latter has, in effect, an "industrial staff" attached to it to carry out the duties required by Mr. Johnson.

To combine together at one works the engineers mentioned, electrical, mechanical, heating, ventilating and structural, is not practicable. To be "Jack of all trades and master of none" is surely inefficient. To master all the branches of electrical engineering is more than a life's work; we claim to be electrical engineers in every sense of the word, but when we have a problem involving the intricacies of another trade we seek the expert advice of that trade which has also made a lifetime study of its own particular problems; this arrangement makes for amicable working and is good practice.

So far as electrical engineering is concerned, the specialists which Mr. Johnson mentions are already employed by such firms as ours and our competitors, and if he would investigate the variety of work that is carried out from day to day he would be amazed. The following are a few of the problems which we take in our normal stride:—

Re-design and re-wind a four-speed motor from two-phase, 200 V to three-phase, 400 V. Arrange the automatic control and loading of an annealing furnace and carry out the installation. Procure immediately the billet and make an 8 ft. by 8½ in. dia. 250-HP motor shaft, remove damaged shaft and fit new one, at the same time weld broken bearing pedestal and make patterns, castings, machine and re-line broken white metal bearings; investigate failure of electrical and mechanical safety devices and check process to ascertain why shaft failed; all this work was completed under war conditions in eight days.

Re-wind a Swiss 8,000-kVA 11,000-V turbo-alternator because the foreign manufacturer could not undertake the work. Renovate an old low-speed generator and make M.G. set with a modern high-speed motor complete with vee flat drive, including correction of power factor in two weeks. Adapt test alternator and vehicle engine on fabricated bedplate in less than 24 hours and install at Coventry during raid period to supply power for water pump. Repair l.v. cable damaged by incendiary bombs morning after raid; extensive work completed alongside a D.A. bomb in less than eight hours. Repair windings of an e.h.v. motor pierced by bomb splinters in midst of demolition and repair squads. Adjust door mechanism on electrical furnace.

Provide and fit spare coils, contacts and resistances for large damaged American automatic gear-cutting plant. Rewind heating elements on an electrical varnish heater, 110 kW, including renewal of special insulation. Convert American gas heated chemical convertor to electric heating, 850 deg. C. Alter electric hoist block from hand travel to motor travel and install four-station remote control. Design foundations and install 12,500-kVA, 100-ton alternator in middle of a field, temporary cover fixed as permanent building was delayed.

The matter of maintenance service at present due to war conditions is very difficult and the amount of apparatus failing due to overwork and the lack of the maintenance which Mr. Johnson mentions is simply staggering. In addition, the repair of plant damaged in raids is stressing the facilities so much that to send men out on maintenance work is now nearly an impossibility. It is not possible to augment the labour available at present to give more maintenance service, and as for the "works engineers" mentioned I can assure Mr. Johnson that in the majority of cases these gentlemen are giving of their best, plant is working day and night, running repairs required are being carried out and maintenance done at week ends, but a week's work cannot be done in a week end, therefore items are bound to be missed with the result that a failure occurs sooner or later.

I am sure that post-war "electrical service" will be such that Mr. Johnson will not complain.

J. ASHMORE, M.I.E.E., M.Am.I.E.E.,
Birmingham. *District Manager*,
British Electrical Repairs, Ltd.

Commercial Professional Staffs' Salaries

IN your issue of October 23rd, Mr. J. H. Rickward voices a grievance against N.A.L.G.O. I have read the correspondence to which he refers and find that he has not told the whole story.

In my original letter I mentioned the failure of the Electricity Supply Commercial Association because local authorities refused to recognise differentiation between salaries in different departments. Mr. Rickward's grievance is that the West Bromwich branch of N.A.L.G.O. would not, at his peremptory demand, insist that the Town Council should accept such differentiation. He complains, too, of delay in replying to his letters. In fairness he might have added that apart from the correspondence he had had conversations with the hon. secretary of the branch, who had explained why the assurance he asked for could not be given.

The facts briefly are that in March last the Regional Officer of N.A.L.G.O. asked the Salaries and Wages Committee to substitute the provincial Whitley Council scales for the existing scales and to establish a joint consultative committee to settle grading. The Town Council approved the application on June 30th.

In May the Electricity Committee recommended the Salaries and Wages Committee to appoint Mr. Rickward—who was chief clerk and temporary commercial assistant—commercial assistant and to increase his salary. Previously there had been no office of commercial assistant. The recommendation was referred back by the Salaries and Wages Sub-Committee pending the probable formation of the joint consultative committee. Thereupon Mr. Rickward at once presented his demand. The Branch did not turn it down, but they naturally declined to give assurances before they had had an opportunity to consider salaries as a whole, and a month before the Town Council had agreed to their application.

For many years Mr. Rickward has benefited substantially by the advantages N.A.L.G.O. has secured, and has never resisted the implicit comparison of his appointment with others under the Corporation. Indeed, if he had been excluded from such benefits as superannuation on the plea that no parallel could be drawn between his department and others I venture to think that he would have resisted the exclusion and scorned the excuse.

I hope that the official staffs of municipal electricity undertakings will resist the temptation to repeat previous failures in organisation, but will strengthen unity in N.A.L.G.O. which has already benefited so many. I am sure that reasonable applications will be taken up with determination and efficiency, but it must be evident that small value would be attached by any local authority to the representations of a branch which was prepared to give assurances in advance in the circumstances of Mr. Rickward's case, demanded in the manner that he so unfortunately adopted.

Leeds. THOS. NOLAN.

Carbon Lamp Prices

WITH regard to the letter from Mr. H. C. Busbridge in your issue of October 24th, the following views may clarify the situation and possibly anticipate a statement by the Electric Lamp Manufacturers' Association.

It will be appreciated that since the introduction of the metal filament lamp the sale of carbon filament lamps has considerably diminished and to-day it is believed that their widest use is in connection with battery charging boards and ray therapy apparatus; consequently, it must be expected that the retail price charged for these bulbs would be rather more than 1s. each. Records show, however, that for some time the production of carbon filament lamps has been steadily increasing due to the rising demand for radiant heat lamps and one might expect a drop in manufacturers' prices at some future date.

It must be admitted that the retail prices charged for these lamps by the various concerns who market the complete radiant heat unit, which consists of a reflector, lampholder, etc., are by no means standard and may vary by as much as 100 per cent. for the same lamp. This state of affairs is due to the psychological reaction of the general public. For instance, the majority of people who have heard of a radiant heat lamp associate it with treatment received at hospitals and clinics and, of course, imagine that it is an expensive piece of apparatus "something like an X-ray machine." It

will be understood, therefore, that if the public are offered a radiant heat lamp for use in the home at prices ranging from 2 to 5 guineas they will not consider it unreasonable, but offer them a unit at 15s. or 25s. with bulbs at 2s. each and the immediate reaction is " it is too cheap to be any good."

This is not mere conjecture, but based on personal experience; in fact I have always found it more difficult to sell the cheaper models from a range of lamps, even to people who are obviously not too well off, and the customer's explanation for deciding on a more expensive model is invariably " I feel it would do me more good."

It is quite agreed that radiant heat lamps should be made available to everyone, but it appears that the only way to convince the public that such lamps are efficient in spite of the moderate cost at which they could be supplied, is for the electricity supply authorities to give the matter constant publicity, backed by generous window display in the showrooms and have someone available, competent, to advise customers as to the suitability of treatment for various complaints. If the job were tackled in the right manner, it would divert many of the thousands of pounds spent annually on patent medicines into the coffers of the electrical trade and, in addition, the public would be using units instead of pills, which is a much better idea.

H. HOWARD FREEMAN,
Richmond, Surrey. *Director,*
Electrical Utilities, Ltd.

Engineers' Salaries

THE letter from Mr. Andrews on this subject in your issue of November 7th, undoubtedly expresses a point of view widespread amongst the engineering staffs of most manufacturers. The realisation that the final decision of this war depends ultimately on engineers at the point of production has certainly caused many engineers to consider their work in terms of its value to the community as a whole and this has led to a comparison of salaries in various branches of the profession.

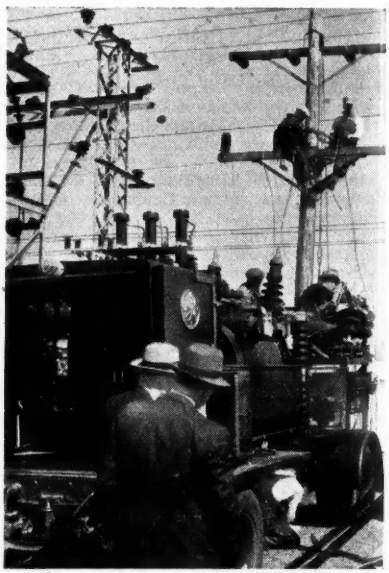
A large section of the industry has proceeded further with the analysis and has discovered that the salaries paid to engineers in municipal undertakings are the result of collective agreements whereas the salaries and conditions in manufacturing organisations are based on individual bargaining. After thinking over the facts calmly and logically as befits engineers it became obvious that only by collective action as a group could the engineers employed in design and manufacture hope to approach the conditions enjoyed by their colleagues who operate the plants. Action followed quickly and engineers all over the country are joining the Association of Scientific Workers which has become the recognised trade union for scientists and engineers employed in industry.

There must be engineers who, like Mr. Andrews, have not yet thought of collective action as the alternative to individual appeals to the charitable instincts of the " rich manufacturing concerns " and the moral should be clear. In conclusion it should be pointed out that the A.Sc.W. recognises that engineers as a group have social obligations and at the present time in addition to putting forward the claims of engineers for a higher status the organisation is also mobilising its members in the effort for maximum production to ensure a speedy victory.

Manchester. J. F. AMOR.

Mobile Power Station

IN our issue of March 28th last we gave some details of a mobile substation built for the Central New York Power Corporation by the American General Electric Co. It comprises an oil-cooled three-phase 1,000-kVA transformer with primary and secondary switchgear mounted on a four-wheel chassis. Connection can be made to 11-, 13-, 22-, 33- or 44-kV lines for stepping down to 230, 460, 2,300, 4,000 or 4,600 V. Apart from emergency use the plant is used for by-passing service substations during repairs and maintenance.



Connecting up a mobile substation

The accompanying picture shows the plant being connected up to relieve a heavily loaded substation while changes are being made. It is stated that the connection can be completed in about thirty minutes if necessary.

INSTITUTION PROCEEDINGS

Simplified Installations. Industrial Lighting.

Porcelain Insulators

CHARACTERISTICS and performance of high-voltage porcelain insulators were discussed by Mr. J. S. Forrest (Central Electricity Board) in a paper presented to the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 20th.

The paper commenced with descriptions of the apparatus used by the C.E.B., and it was explained that for laboratory investigations two testing sets of 85 and 250 kV were installed outdoors. Associated with each were a tower and rack, enabling continuous pollution tests to be made simultaneously on sixty insulators, on all of which counters were provided to record the leakage current "surges." Field tests were made on overhead lines in service with the aid of a capacitance potential divider and an electrostatic voltmeter. The potential distribution on the insulator was measured and faulty units were detected by the abnormally small potential drop across them. A surge counter was also applied to equipment in service in order to indicate when insulator cleaning became necessary.

Effects of Weather Conditions

The second half of the paper contained results of investigations made with the apparatus above referred to, including information concerning the performance of insulators of the line and post and bushing types. Their behaviour was discussed, revealing the highly irregular distributions of potential and leakage current surge records obtained in fog and similar weather conditions; normal and anti-fog insulators were compared and the manner in which flashover occurred in fog was described in detail. Discussion of good anti-fog requirements led to the recommendation that for use in highly polluted and humid atmospheres a leakage path of 2 in. per kV applied should be the working basis for the most severe conditions.

Reference to new designs of insulators indicated leakage surging to be an inherent characteristic of the porcelain surface, which did not occur when part of the path consisted of an oil surface. The oil-bath insulator (fig. 1) was accordingly the ideal anti-fog design, but it was not much used as it involved additional maintenance. But this was not so great as might be imagined, and it could easily be justified when atmospheric conditions were severe, since performance continued to be satisfactory even when only a small quantity of oil remained in the bath. Six strings of this type had given satisfactory service on a 132kV overhead line for the past two years; only six units per string were required.

Length was not the only necessary characteristic of the leakage path. It would not be advantageous to obtain it by means of deep and closely spaced shedding, as spark-over would then occur across the top of the sheds. Apart from this feature, the most important requirement was that the path should be uniform and symmetrical in order to avoid variation of the surface resistance.

In modern anti-fog designs the endeavour was to preserve uniformity by the type of shedding employed for Lapp line post insulators. A similar kind of shed was utilised for a high-voltage suspension type which was being newly developed in England. Outdoor tests

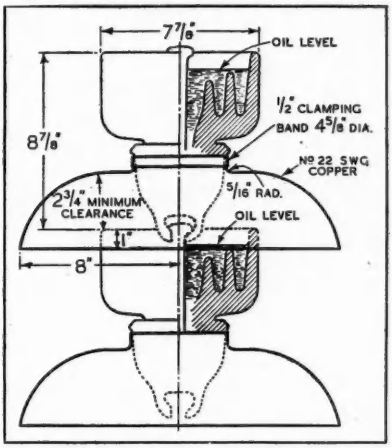


Fig. 1.—Experimental oil-filled insulator

extending over long periods showed that thg potential distribution on a porcelain strine could be maintained uniform and constant under all conditions if the insulator units were initially given a fixed resistance of relatively low value. Experimentally shunting each of an eleven-unit string with 10 megohms had a stabilising effect, as it was impossible for any unit resistance to increase above that value, so that excessive voltage drops on certain units and correspondingly small drops on the remainder could not occur (British patent 527, 357). The steady leakage current due to the resistors was less than 1 mA and not in any way detrimental.

Attempts were now being made to discover a method, satisfactory from the manufacturing point of view, of incorporating such stabilising resistors within the porcelain units. When

that object had been achieved the resulting insulator should be capable of very satisfactory performance in polluted atmospheres.

Service experience of modern high quality insulators showed that their rate of deterioration should not exceed 0.1 per cent. per year. Nevertheless field tests were essential because a single faulty unit might cause the failure of a whole string; in approximately 90 per cent. of cases field diagnosis was correct. Deterioration resulted from cracks in the porcelain head, which commenced during the manufac-

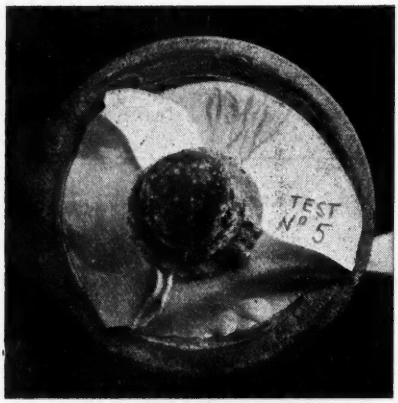


Fig. 2.—Faulty insulator, showing tree-like discharge markings on the surface of the crack

turing process, possibly of molecular dimensions, without penetrating deeply into the porcelain body. They could not be detected by any of the normally applied tests, and were developed by mechanical and thermal stresses, perhaps for years, ultimately extending through the head from the cap to the pin. The high resistance of the initially clean surfaces of the cracks was gradually reduced by the entry of moisture, finally causing electrical discharge that formed characteristic tree-like markings on the surface of the porcelain (fig. 2).

In conclusion data were presented relative to interference with radio reception that was generated on the insulators of high voltage overhead lines and propagated with little attenuation along the conductors, which radiated the radio-frequency disturbing field. The cause was small spark discharges that occurred over insulators in normal operation, even when dry and clean. The disturbance was most intense during dense fog when the field increased to 100 times (by 40 db) its dry weather value. The attenuation of the interfering field was very rapid at right angles to the power line, a decrease of 25 db occurring in 50 yards, at which distance from the line local broadcasting might be received virtually free from interference even in the worst weather.

Wartime Problems

THERE was a good attendance at the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 13th for the informal meeting of the Installations Section when the "Solving of Wartime Electrical Problems" was discussed. Following the opening remarks of Mr. A. G. Ramsey, chief engineer, Ministry of Works and Buildings, which were summarised last week, Mr. F. C. Raphael said that for seventeen years he had been advocating single-pole fusing on two-wire AC circuits whenever the neutral was earthed in accordance with the Electricity Commissioners' Regulations. Busbar chambers could not be eliminated altogether, for in many instances they represented economy, which could be effected so soon as supply authorities decided that only one meter was necessary for every installation.

Unshaded lamps fixed to the ceiling would result in loss of production owing to shadow and glare. They must have reflectors, and manufacturers must find some material that could be better spared than steel and would take a coat of white vitreous enamel. Flexible cords must be more economical in every way than tube pendants. Cleat wiring was not always economical, either in material or labour: the cost of running the earth wire was sometimes a large proportion of the saving effected by using cleat wiring.

Mr. E. W. Murray could not support the use of unshaded lamps, for reasons of glare as well as blackout. Because of the risk of fatal accidents, skirts were essential on lampholders. There were five ways of connecting an Edison screw-cap holder, only one of which was correct.

Mr. W. N. Craig remarked that the total weight of steel needed for trunking was less than for conduits. With proper forethought in planning trunking could be made unobtrusive. Overhead busbars also reduced conduit and cables. Extension of the three months' life of temporary installations would leave openings for slovenly work.

Relaxation of Regulations

Mr. A. Morgan suggested that Factory Act requirements could be relaxed with advantages in economy and without loss of efficiency. He thought Mr. Ramsey had overlooked I.E.E. Regulation 503, which permitted a longer period than three months for temporary work providing it was completely overhauled every three months. In future factory wiring would be by busbars throughout, with dropdown flexibles to the machines.

Mr. H. Lingard said that for lighting working areas it was generally necessary to employ equipment of a somewhat special and well-made character, so that great economies did not appear to be possible. Bare lamps without fittings would mean wastage of as much as

84 per cent. of the effective illumination. Mr. F. G. Quance referred to the great difficulty of obtaining labour for the manufacture and assembly of accessories. Manufacturers had already simplified and reduced the number of types of accessories, in which endeavour they would like to receive more support from designers. When substitute materials could be produced in adequate quantities and at comparable prices manufacturers would not lose time in adopting them. Switchplugs had been specified in far too great quantities, but he could not support Mr. Raphael's suggestion for the extended use of 5-A plugs.

Mr. F. S. Naylor believed that Mr. Ramsey's remarks on the positioning of lamps had been misread. He exhibited a simple type of lighting unit for air-raid shelters that had been used throughout Southwark. It was made of a conduit box with a single switch let into the top together with a lampholder and wire guard. The fitting was cheap, easily replaced and had other advantages.

Mr. C. McKearney pointed out that alternative types of fittings for fluorescent lamps hindered bulk buying as well as standardisation by makers.

Rationing of Fittings

Mr. R. H. Rawll said that many hundreds of workshops definitely required their lighting extended and improved; the solution would have to be rationing of fittings. A simple code of safe practice could be easily drawn up for average factory purposes to-day. A lead must be given and the I.E.E. should give it. Regulations could be relaxed without making installation unsafe.

Mr. A. R. Cowell said that if a manufacturer obtained a demand for some kind of product he would make it, and could not be blamed; it was the user who must limit his requirements. Simplicity was not desirable in wartime only, for the average piece of electrical apparatus was far too complicated. Mr. Ramsey might have laid greater emphasis on group switching, and for the purpose of avoiding glare the higher lamps could be installed the better.

Mr. R. A. Woodford explained the difficulties of wiring Post Office apparatus rooms where v.i.r. wire on cleats was not very satisfactory. Lead covered cables could be quickly and neatly installed.

Mr. E. Jacobi pointed out that the suggested lowering of the standard of wiring was intended to be a wartime measure; it might be satisfactory if applied not only to factories but ultimately to offices and private residences, but some revision of the I.E.E. Regulations seemed to be necessary.

Major K. H. Tuson thought that standardisation should not be carried too far. Designers and users must refrain from adding one factor of safe y to another. He mentioned a recent case in which 6-HP motors were suggested for plant calculated to require 3.45 HP only.

Mr. H. W. Swann, in a written communication, said that insufficient attention had been devoted to circuit protection. The importance of that aspect increased when cheaper and more hurriedly installed systems were necessary. There should be careful attention to grading with proper subdivision of circuits, which was not an unnecessary expense or at variance with wartime requirements. Mr. D. M. Fraser, also in a written communication, said that as a wholesale distributor he would stress the imperative urgency of wartime codes to attain sufficient safety and at the same time stop waste of material and labour. Compulsory inspection would be necessary after the war to avoid the danger of wartime work remaining in permanent use.

Mr. T. Simmons, in a written communication, suggested the use of batten-type lampholders in many cases and advocated all-insulated systems. The difficulty of running an earth wire might be overcome by employing a three-core cable. He did not appreciate the reason why trouble should be experienced with tee-connections provided that properly designed connectors were employed and that skilled men carried out the work.

Mr. R. F. McConnell, in a written communication, suggested that the I.E.E. should impress upon all concerned the need to consider simplification, tolerance of substitution and standardisation of electrical methods and materials. Also there was need for improved co-operation between the C.M.A. and the designers of factory installations. There might be more use of triple-pole switch-fuses for controlling light in large machinery bays. Local lighting of machine tools would be unacceptable with unscreened light sources.

The Author's Reply

Mr. A. G. Ramsey, in reply, said that the discussion had been too wide to enable him to answer all the points made. Admittedly he was suggesting lowering the safety of the installation and when that was the case circuit protection must be watched and adequate safeguards provided. Single-pole fusing was being carried out in quite a number of installations and it certainly resulted in economy. There were many 5-A plugs on the market which he would not dare to use for 10-A. Much closer co-operation between manufacturers to produce standard articles at the very minimum of cost would be necessary after the war if they were to compete satisfactorily in world markets. He agreed that unshaded lamps must have skirts.

He would not relax any rules which affected safety nor would he advocate alteration of the I.E.E. Wiring Rules in wartime. Plastic materials had been used in a far wider field than he or general electrical engineering circles had any knowledge of at present. With regard to cooking equipment a committee consisting of representatives of Government

Departments and users had been set up to try to relate supply more nearly to demand and reduce the number of types.

In closing the discussion Mr. H. T. Young, chairman, said that sweeping and very serious economies were necessary if they were to carry on with the work that had to be done for the remainder of this war.

Lighting Advances

INDUSTRIAL lighting in reconstruction was discussed in the paper by Mr. H. C. Weston that was presented to the ILLUMINATING ENGINEERING SOCIETY in London on November 11th. The author said that many changes were taking place now which were not merely war expedients, so that the end of the war would see a more or less advanced stage of reconstruction rather than its beginning. That would be the case in respect of industrial lighting.

Such new standards as it was hoped would be generally accepted later on must be formulated now; their establishment in those sections of industry upon which the successful outcome of the war so largely depended had been an immediate necessity, and during the past year practically the whole of the resources of the lighting industry had been concentrated on industrial needs.

New war factories had been equipped to recognised standards and some set up fresh standards. The rate at which the re-lighting of existing vital factories was proceeding was limited mainly by the shortage of labour available for installation. The Select Committee on National Expenditure had recommended that necessary cases should be expedited. The Factories (Standards of Lighting) Regulations, 1941, had already led to improvements in a number of factories not subject to the requirements of Government production departments.

"Light-Conscious" Workers

Workers were likely to become more "light-conscious" and those who would return to less well equipped factories would look for conditions at least equally good. Before the war artificial light was used in the average factory for some 15 per cent. of the working time. Proper adjustment of post-war working hours would not necessarily involve a shorter working day; if a shorter working week were more satisfactory, the percentage of working time for which artificial light would have to be used would not alter appreciably.

Following comments on the effects of unsatisfactory lighting in factories and its social significance, the author briefly described how fluorescent lighting had been installed in two new war factories from which daylight had been entirely excluded, one of them having 1,500 tubular lamps. The need for a satisfactory alternative to daylight was becoming increasingly apparent in many interiors. One of the most important industrial needs was reduction of the brightness of lighting units and of the brightness contrast between them and their surroundings. Even when there was not any obvious danger of glare due to reflections of the source, the use of diffusing fittings of low brightness greatly improved the prospect of satisfactory results.

In reconstruction the possibility of altering the background and of modifying the surface to which brightness had to be imparted should be considered. In contrast with illuminating engineering as now generally practised, which adapted methods and equipment to illuminate objects, brightness engineering embraced also the converse process of co-operation and consultation with all whose demands sometimes imposed on the factory the use of designs, materials, finishes, etc., which could be avoided if the difficulties they occasioned were pointed out.

Forthcoming Events

Institution of Electrical Engineers.—*Wireless Section.*—Tuesday, November 25th, 4 p.m. London. Informal meeting. Discussion: "Tests for Radio Components with Particular Reference to Ageing and Atmospheric Conditions," to be opened by Mr. P. R. Coursey, B.Sc. Wednesday, December 3rd, 4 p.m. Paper: "Transmission Characteristics of Asymmetric Sideband Communication Networks," by Mr. E. Colin Cherry.

Meter and Instrument Section.—Friday, December 5th, 4 p.m. London. Paper: "Maximum Demand Metering: a Study of the Timing and Length of the Integration Period," by Mr. D. J. Bolton.

North-Western Centre.—Saturday, December 6th, 2.30 p.m. Engineers' Club, Albert Square, Manchester. Paper: "Outdoor Bushings—Their Construction, Testing and Standardisation," by Mr. W. A. Cook, B.Sc.

North-Eastern Centre.—Monday, November 24th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-upon-Tyne. Informal discussion on post-war planning. Members unable to attend are invited to express their views in writing. *Students' Section.*—Friday, December 5th, 6.30 p.m. Neville Hall. Paper: "High-voltage Phenomena," by Mr. G. H. Hickling.

South Midland Centre.—Monday, December 1st, 6 p.m. James Watt Institute, Birmingham. Paper: "Characteristics and Performance in Service of High-voltage Porcelain Insulators," by Mr. J. S. Forrest, M.A., B.Sc.

West Wales (Swansea) Sub-Centre.—Saturday, November 22nd, 3 p.m. Technical College, Mount Pleasant, Swansea. Address: "Review of Progress,, 1891—1941," by Mr. E. Jones, city electrical engineer of Cardiff.

London Students' Section. — Wednesday, November 26th, 7 p.m. Paper: "Electroplating," by Mr. C. V. Taylor, B.Sc.

Association of Mining Electrical and Mechanical Engineers. — *South Wales Branch.* — Saturday, November 29th. Pontypridd. Paper by Mr. G. M. Harvey, H.M. Electrical Inspector of Mines.

COMMERCE and INDUSTRY

Retail Business Restricted. *Regional Power Control.*

Bring Out Your Waste

ONE of the latest developments in the campaign for recovering all unwanted paper is a new Defence Regulation permitting companies to get rid of security transfer deeds over three years old. Hitherto it has been customary to keep these deeds for long periods. The Regulation will protect a company from any liability in respect of the destruction of deeds more than three years old so long as it acts in good faith and without notice of any claim to which the transfers may be relevant.

This should help company secretaries in the process of clearing out their unwanted documents and correspondence for conversion into components of munitions of war

Where your waste paper goes: A giant board-making machine described in our August 22nd issue

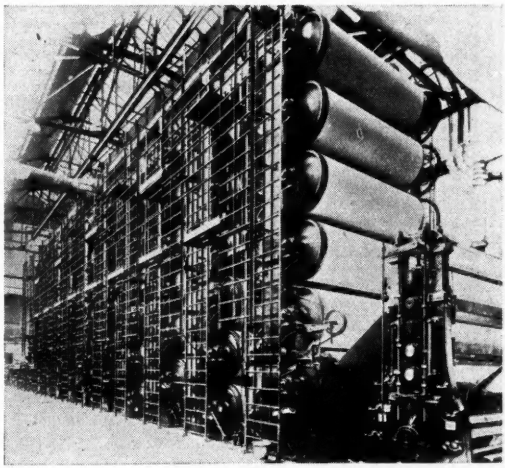
and should encourage them to go farther than they have hitherto considered expedient in deciding what can be dispensed with. It is inevitable that risks must be taken, but such risks are negligible in comparison with the greater danger which they can help to avert by turning over to the mills all the waste paper in their charge.

Once again we call upon all electrical concerns to do their utmost to swell the volume of paper which is now being turned out of works, shops, offices and homes all over the country. If they have not yet appointed somebody with the special task of looking after this matter they should do it at once.

Control of New Shops

After January 1st no persons will be allowed, except under licence, to use any premises for the sale by retail of any categories of goods or the performance of any service specified if those goods were not being sold or if the services were not being performed at the premises in question at any time during the period from December 1st, 1940, to October 23rd, 1941. Consequently, traders who at any time after October 23rd, 1941, start a new business or start to carry on a business in a new category of goods or services will not be able to continue doing so after January 1st without a licence. Foodstuffs are not included in the schedule of goods and the only services affected are hairdressing, beauty treatment, circulating libraries and auctioneers. This is the effect of an Order (The Location of Retail Businesses Order, 1941) made by the Board of Trade last week to implement the recommendations contained in the interim report of the Retail Trade Committee.

In general, a licence will be granted only if it can be clearly shown that the goods or services which the applicant proposes to sell or perform are reasonably required in order to meet the essential needs of the public in the area concerned. Special consideration will, however, be given to traders who have lost the use of their premises through enemy action, through action taken by the Forces in defence of the country, or through requisitioning by a Government Department.



The schedule of premises affected by the Order includes those dealing in the following classes :— Radio goods, gramophones and accessories ; electric torches and batteries therefor ; and electrical goods and appliances other than the two foregoing classes.

Licences will be issued regionally on behalf of the Board of Trade by the local Price Regulation Committees. Applications should not, however, be made before December 11th. Full particulars of the licensing procedure will be issued later, but inquiries may be addressed to the Assistant Secretary, Industries and Manufactures Dept. I, Board of Trade, Millbank, S.W.1.

Small Iron and Steel Orders

Provisions already exist for facilitating the purchase of small quantities of iron and steel; these are extended to small orders for articles containing iron and steel by the Control. This will enable a supplier of manufactured articles fulfilling orders each of which involves only small quantities of iron or steel, but who buys appreciable quantities in the aggregate, to obtain a bulk authorisation covering the tonnage needed and so avoid asking each of his customers for a separate authorisation. As the quantities of iron and steel available for bulk authorisation will be limited, a responsibility will rest on retailers, wholesalers and manufacturers to see that small orders for articles containing iron and steel are only accepted for purposes which are essential

and that the articles which they supply are fairly distributed.

The Ministry of Works and Buildings will issue the bulk authorisations in the case of articles required primarily for the building trade, which include cable racks and hangers and conduit fittings. Applications for the necessary forms should be made to the Ministry of Supply, Iron and Steel Control, Steel House, Tothill Street, S.W.1. Applications in respect of other articles should be addressed to the Assistant Secretary, Industrial Supplies Department, Board of Trade, Millbank, S.W.1.

Fuel and Power Controllers

The President of the Board of Trade has appointed Regional Fuel and Power Controllers to the Civil Defence Regions for the purpose of co-ordinating the regional activities of the Departments concerned in respect of coal, electricity, gas and oil. In case of emergency they will take charge of these interests under the Regional Commissioners.

It is emphasised that the normal administration of these departments will continue as at present and will not affect the work or position of the Board of Trade representatives in the Production Executive's Regional Boards

The new controllers are as follows :—London and South Eastern Region, Col. J. C. Dalton (County of London Electric Supply Co.);

Electro-magnetic crane recently put into service on the L.M.S. system to speed up the discharge of railway wagons

Scottish, Sir Nigel Campbell; Northern, Mr. Clive Cookson; North-Western, Earl of Crawford; North-Eastern, Dr. H. S. Houldsworth; North Midland, Sir William Firth; Midland, Sir Bernard Docker; Eastern, Mr. H. H. Holmes; Welsh, Mr. E. L. Hann; Southern, Col. H. W. Woodall (Measurement, Ltd., and Parkinson & Cowan, Ltd.). The appointment to the South-Western Region is to be announced later.

Trade with Portugal

The United Kingdom Commercial Corporation (Portugal) was formed as a private company on November 5th with a capital of £50,000 in 50,000 £1 shares to carry on trading operations of all kinds in Portugal and its colonies. The object of the company as for other such concerns formed by the Government-sponsored parent company, the United Kingdom Commercial Corporation, in Turkey, Palestine, Egypt, Iran, Spain and Iceland, is to foster commerce in circumstances where the ordinary trader cannot carry on, but not to displace him.

Post-war Export Trade

The Secretary of the Department of Overseas Trade has appointed Mr. J. Rodgers as Director of Post-war Planning in the Department. He will be concerned mainly with the investigation of problems of United Kingdom export trade after the war. Mr. Rodgers has been Adviser on Overseas Planning in the Ministry of Information.

Imports into Northern Rhodesia

Mechanically cooled refrigerators and electric cooking and heating appliances have been removed from the list of items the importation of which into Northern Rhodesia is prohibited when manufactured in any part of the British Empire except Canada or Hong Kong.

Magnetic Crane for L.M.S.

With a view to speeding up the discharge of railway wagons conveying important consignments of iron and steel, an electro-magnet has recently been fitted to a 40-ton electrically operated Goliath crane used on the London, Midland & Scottish Railway Co.'s system. The magnet is 38 in. in diameter, constructed of high permeability steel and is designed for general use. The weight which it will lift varies from 7 cwt. to 7 tons, depending on the size, shape and class of the ferrous metal to be lifted. It is controlled by a hand-operated potentiometer controller and is energised at 220 V, DC from an AC/DC motor generator set mounted on the crane. The loading of the magnet and control gear is 4¼ kW. The magnet coil is fully impregnated against ingress of moisture and is suitable for outdoor use in all weather conditions. The flexible cable to the magnet is provided with an earth wire as a safeguard against possibility of shock to those handling the magnet.

Chief Engineers' Salaries

Plymouth City Council has referred back for reconsideration a recommendation of the Electricity Committee that the salary of the city electrical engineer (Mr. H. Midgley) should be raised from £1,400 to £1,520 per annum until March 31st next, and should thereafter be in accordance with the scale agreed to by the National Committee of Local Authorities and Chief

Electrical Engineers for the Electricity Supply Industry.

Old Linen Tracings

From old linen tracings sent by architects, engineers and others to the Building Centre collection, the Women's Voluntary Services have had 75,000 sheets washed and sent to their work parties for conversion into articles for hospital use. Those who still have by them bundles of old linen drawings are asked to send them to the Women's Voluntary Services for Civil Defence, Forbes W.V.S. Depot, 93, Eaton Square, London, S.W.1, marked "Building Centre Collection."

Control of Steel Springs

The Control of Iron and Steel (No. 16) Order, 1941, made by the Minister of Supply, extends control to all types of springs, but no authority or licence is required for their acquisition except in the case of laminated or coil springs containing either round rod of not less than 5-16 in. in diameter or other iron or steel material of a corresponding cross-sectional area.

Indian Import Restrictions

Goods, the import of which into British India is now prohibited except under special licence or Open General Licences Nos. I to VII, include electric bulbs, metal lamps and parts, domestic refrigerators, electric table and ceiling fans and parts, and wireless receiving apparatus and components.

Consumer Fined

There was an unusual case before the Widnes magistrates recently when an electricity consumer was summoned for culpable negligence by removing the insulation of electric cables leading from her supply to the meter. It was stated that by reason of the cutting of the insulation anyone with electrical knowledge could tap the wires and get a free supply of electricity. Defendant was fined £1.

Air-raid Shelter Fatality

Mrs. Edith Whitfield, aged 52, of Hessle, Yorks, received a fatal shock from an electric fire in her garden air-raid shelter on November 4th, and her husband was injured about the hands. They had gone together to turn the fire round so that it faced into the shelter, when the tragedy occurred.

Change of Address

The London Electric Wire Co. and Smiths, Ltd., together with their associated companies, Frederick Smith & Co. and the Liverpool Electric Cable Co., Ltd., have opened a joint London branch and warehouse at 31/33, Spenser Street, Westminster, S.W.1 (telephone: Victoria 0504).

Calendar

The picture of a charming young lady talking to her dog, silhouetted against a summer sky, decorates the calendar with monthly sheets sent to us by Gabriel, Wade & English, Ltd.

Kelantan Customs Duties

The following customs duties have been imposed on goods imported into Kelantan, Malaya:—Electric batteries, 15 per cent. *ad valorem* (preferential duty 5 per cent. on batteries for electric torches and hand-lamps and free in the case of all other batteries). Electrical apparatus, accessories and equipment including electric wire, lamp bulbs and lampshades of glass and china, but excluding batteries, 10 per cent. (preferential duty free). Parchment, paper and bamboo lampshades, 10 per cent. (preferential duty 5 per cent.). Silk, artificial silk or cotton lampshades, 20 per cent. (preferential duty, 10 per cent.).

New Catalogues and Lists

E. K. Cole, Ltd., Southend-on-Sea.—A folder describing the new range of sales aids available for "Ekco" and "Sirius" lamps. Also a folder dealing with "Ekco" scientific light planning.

Rotameter Mfg. Co., Ltd., Vale Road, Portslade, Sussex.—A folder dealing with "Rotameters" British-made precision glowmeters for all gases and liquids.

British Insulated Cables, Ltd., Prescot, Lancs.—Catalogue N.S.C.8 dealing with "Rockbestos" heating cables for metal pipes and pipe lines.

B.E.N. Patents, Ltd., High Wycombe.—A leaflet describing the new B.E.N. No. 269 blow gun which is specially suitable for swarfe removal.

TRADE MARK APPLICATIONS

THE following applications for British trade marks have been made. Objections may be entered within a month of November 12th.

SUNBEAM (design). No. 611,256, Class 7. Food mixers, food grinders and choppers, drink mixers, bean slicers, pea shellers, potato peelers, ice-cream freezers, knife sharpeners, polishers and buffers, coffee grinders, tin openers, slicers and shredders, all electrically operated, and parts thereof.—The Chicago Flexible Shaft Co., 5,600, Roosevelt Road, Chicago. Address for service, c/o Frank B. Dehn & Co., Kingsway House, 103, Kingsway, London, W.C.2.

AIRSEALAND. No. B615,568, Class 9. Wireless apparatus, signalling apparatus, hydrophones, sound detectors, sound locators and sound recording apparatus.—Airsealand, Ltd., 43, London Wall, London, E.C.2.

JEMU. No. 616,225, Class 9. Loudspeakers, telephones, microphones, volume controls for radio receivers, and electric relays.—E. S. Newland, trading as Jem Utilities, Wendover Street, High Wycome, Bucks.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

AVIONAL synthetic material for insulating purposes.

ELECTRILITE contact breaker (chemical type) to operate spark coils.

Labour and Output

Provision of Technical Staff

THE twenty-fifth report of the session from the Select Committee on National Expenditure sets out the views of the appropriate Government Departments upon the recommendations made by the Committee in its twenty-first report which dealt with the output of labour. It is not thought feasible to keep detailed records of workers' outputs in all establishments, as suggested by the Committee, but it is agreed that a closer watch should be kept on output records and on records of labour wastage, absence from work and idle time.

Investigations carried out by the Industria Health Research Board indicate that, over an extended period, weekly hours of work should not exceed sixty for men and fifty-five for women. All Departments agree that Sunday work (except for the beginning or end of night shifts or when the workers get a break of at least twenty-four hours under a rota or relief system) should be restricted to such essential repair and maintenance work as cannot well be done at other times and to special occasions to meet exceptional emergencies.

The Departments recognise the need for employing factories for as much of the twenty-four hours as possible and the necessity is impressed upon firms whose products are urgently required of organising double and even treble shifts wherever practicable.

Scheduling of Establishments

The Government does not view favourably a suggestion that a persistent offender who refuses to obey a direction under the Essential Work Order should be de-reserved. The scheduling of firms under the Essential Work Orders is said to be proceeding as rapidly as circumstances permit. It is not always possible to proceed with even the provisional scheduling of establishments without previous discussion with both sides of the industry concerned. Difficulties are encountered where there is no agreed time rate, the payment of which is one of the stipulations of the Orders.

The report also deals with such matters as transport arrangements, "staggered" pay days and the arrangement of working hours to permit women employees to do their shopping.

The Committee recommended that the work of improving the lighting of factories should be expedited. It is stated that factory inspectors have been reminded of the importance of the matter and considerable improvements have been made. This is, however, a difficult time for getting alterations made, especially as electricians are very largely employed on work which is of great importance and urgency, including repairs to lighting installations in factories and other classes of premises, and installations in new factories. There is, moreover, some shortage of materials.

Dealing with questions relating to the supply and training of labour, the report refers to the creation of a "Mobile Skilled Corps" at the Royal Ordnance Factories. This consists of skilled men who are prepared to go to other factories as necessary for long or short periods to meet specially urgent demands, to start up new production, to train unskilled staff, etc.

Technical Training

As regards the provision of technically qualified staff for design and inspection work, in order to increase the supply of men with the necessary technical qualifications a scheme of State bursaries has been put in hand for university training in physics, engineering and chemistry, designed to increase the input of the universities of students in these subjects. Some of the bursars will be available in 1942, but most of them in the following year. These should cover from 2,000 to 3,000 persons. Intensive training courses in electrical and mechanical engineering approximately up to the level of the Higher National Certificate are also being arranged; these may provide for 1,000 persons. Measures have also been taken to provide personnel for the lower grades of inspectors and viewers.

The necessity for employing small as well as large firms on Government work is recognised by the production Departments and the Ministry of Aircraft Production set up a directorate of sub-contracting before the war. This has now been expanded and contains a number of representatives in each Region whose duty it is to find and maintain a record of small capacity available and to effect introductions between small firms and the larger firms which need capacity. The Ministry of Supply and the Admiralty have also taken special steps to encourage sub-contracting and the spreading of small orders.

Anti-Dermatitis Preparations

THE Board of Trade have issued a General Licence (S.R. & O. 1941 No. 1741) permitting the supply, outside quota, of anti-dermatitis preparations to firms engaged in various activities, including the supply of electricity and gas; the operation, construction, maintenance and repair of motor vehicles; engineering and metal plating. Firms wishing to obtain these supplies must send to their supplier a declaration stating the value of the goods required and the nature of the business which the firms carry on. They must also state that the goods will be used solely for the prevention of dermatitis among their employees, and will not be resold.

ELECTRICITY SUPPLY

Aldershot Rate Relief Debate. New Glasgow Site.

Aldershot.—DECISION AGAINST RATE CONTRIBUTION.—For a number of years the local rates have benefited from the profits of the Electricity Department, and when at the last meeting of the Borough Council it was recommended that no contribution should be made this year there was some opposition. The Electricity Committee considered that in view of the rising cost of coal and probable post-war conditions there should be no transfer from the profits this year. It recommended that application should be made to the Electricity Commissioners for permission to charge £6,798 of loan sanctioned as a revenue contribution from the appropriation account.

The Deputy Mayor, who moved an amendment that the Committee should be invited to contribute the amount permitted by statutory regulations, felt that the town should enjoy some of the profits. Councillor T. H. Day thought it was wrong to put profits into reserve on the pretence that something might happen. After increasing the charges the Committee had made a profit; if it didn't want to contribute it could take off the increased charges. Alderman J. M. White, recalling that in the past the equivalent of a penny rate had been given, spoke of the security of the rates which the undertaking had enjoyed. The Mayor said he favoured contributions from trading undertakings which made a profit, but thought that at the present time the Electricity Department should conserve its finances rather than distribute the surplus.

Councillor P. T. G. Dibden, chairman of the Electricity Committee, said they considered that the best policy would be to use some of the profits in not taking up certain loans sanctioned; this would be to the benefit of the ratepayers. After the war everybody would be poorer and electricity would be needed at as cheap a rate as possible. Councillor B. Edgoose supported the need for looking ahead. The amendment was defeated by thirteen votes to four.

Amble.—NEW SUBSTATION.—The erection of a substation by the Urban District Council has been sanctioned, the cost (£650) to be met from surplus revenue.

Chepping Wycombe.—CONSUMERS READ THEIR OWN METERS.—In view of the fact that since the war started many women are away from home during the day the Electricity Department has adopted a system whereby if consumers are out when the meter readers call post cards are left on which are representations of the face of an electricity meter, and consumers are requested simply to copy the position of the fingers on the dials of their own meters. Mr. C. T. Westlake, the borough electrical engineer, tells us that the scheme is proving very successful, since 80 per cent. of the consumers who receive the cards return them and in nearly every case they are correctly marked, so that the account can be sent without further trouble. If the card is not returned within two days, the consumption is estimated and any adjustment necessary made on the next account. Mr. Westlake does not claim the idea as his own as he believes that it was first introduced by a gas undertaking. Other electricity undertakings which are probably experiencing the same trouble through shortage of labour and houses being closed may, however, be interested in the scheme.

Glasgow.—SITE RESERVATION.—At a meeting of the electricity sub-committee dealing with the site for a new generating station there was submitted a letter from the secretary of the Electricity Commission intimating that the Commissioners saw no objection to the Corporation entering into an arrangement for the reservation of a site offered by the Clyde Navigation Trust, subject to consideration being given in due course by the Corporation to any legal questions which might arise as a result of the site being wholly outside the city and within the statutory area of supply of the Clyde Valley Electrical Power Co. The sub-committee agreed that the town clerk should be instructed to proceed with the completion of the arrangements with the Clyde Navigation Trust for the reservation of the site, and that consideration of any legal questions involved should be continued pending a report being submitted by the town clerk.

MAINS EXTENSION.—The Electricity Committee is to extend distributing mains at a cost of £2,312.

ELECTRIC MOTORS FOR GAS DEPARTMENT.—The Gas Committee has authorised the general manager to purchase through the Electricity Department two 50-HP squirrel-cage electric motors required for booster units.

Great Yarmouth.—SHELTER HEATING.—The Town Council is to request the senior regional officer to approve the installation of electric heating in basement shelters at a number of specified places and at the same time to agree in principle to similar installations in all basement shelters where necessary.

London.—POPLAR.—The Borough Council is seeking sanction to borrow £9,268 for laying a new cable.

SOUTHWARK.—The Mayor states that the electricity undertaking is suffering from restricted sales and higher costs and consequently a deficit has occurred which has been met from the reserve fund.

Middlesbrough.—SHELTER LIGHTING AND HEATING.—Preliminary steps are being taken for lighting and heating all the air-raid shelters in the town. On the basis of an 8-hour day use the cost is estimated at £52,000.

Newcastle-under-Lyme.—SHELTER IMPROVEMENTS.—The Town Council is having a scheme prepared for the heating, lighting and ventilating of all school shelters, and also for the heating of basement shelters where required.

Oldham.—WAR DAMAGE LIGHTING CONCESSION.—The Electricity Committee has agreed to adjust the lighting flat-rate to 1d. per kWh for all consumptions attributable to war damage above the previous corresponding quarter's consumption.

Potters Bar.—SHELTER SCHEME.—In connection with the strengthening of trench shelters at Oakmere and Highview Gardens, the Urban District

Council has submitted to the County Council for approval a scheme for lighting, heating and waterproofing.

Shipley.—MAINS AND SERVICES.—The Urban District Council is seeking sanction to a loan of £2,000 for mains and services.

South Shields.—EXTENSIONS.—The Town Council is applying for sanction to carry out extensions to cables at a cost of £770 to be met out of revenue.

Sunderland.—SWITCHGEAR REPLACEMENT.—The Electricity Committee is to carry out the replacement of switchgear at industrial premises at a cost of £1,850.

York.—OVERHEAD LINES.—The Corporation Electricity Committee is to erect overhead lines on the Tang Hall estate.

Overseas

Canada.—DAMAGE TO TRANSMISSION LINES.—Our Montreal Correspondent reports that a fifth transmission line may be constructed by the Hydro-electric Power Commission of Ontario between Toronto and the Ottawa River to meet emergencies, such as that which occurred recently when a cyclone put out of action three lines and also the telephone line on which reports of damage are obtained. The entire supply might be interrupted if all four lines were struck, whereas the fifth line as proposed might be placed so as to escape damage. The line would cost about $3,500,000 to construct.

France.—TIDAL POWER.—The Société Etude pour l'Utilisation des Marées, which was recently founded by a number of big electrical and chemical enterprises, intends to investigate the utilisation of the tides for industrial purposes, reports the official German news agency.—*Reuter's Trade Service.*

Holland.—ELECTRICITY RATIONING.—It is officially announced that in future no warning will be given before electricity supplies are cut off when comsumers use more than their ration. This applies to both industrial and domestic consumers.

Manchukuo.—YALU POWER PLANT.—The Yalu River hydro-electric plant, which has been under construction for the past five years, is about to be put into operation, the first generator having been completed. The operation of the plant should be instrumental in hastening the economic development of the border regions of Chosen and Manchukuo. Recently authorities on both sides of the frontier met to discuss electricity rates and priority of supply. It was decided that Manchukuo should receive the whole output of generator No. 1. There are three other sets under construction; No. 2 is almost ready and Nos. 3 and 4 will be ready in January and April, 1942.

TRANSPORT

Hull.—TRAM ROUTE CONVERSION.—The Transport Committee has obtained sanction from the Ministry of War Transport to convert the Anlaby Road tram route to trolley-bus operation.

London.—WIDER TROLLEY-BUSES.—Last week we reported the putting into service by the London Passenger Transport Board of trolley-buses originally intended for South Africa. Of these, 25 were to have been sent to Durban and 18 to Johannesburg. The chief feature of interest is that the vehicles are 6 in. wider than the maximum permitted in this country, *viz.*, 8 ft. This enables the width of the gangway and seats to be increased slightly, with a consequent improvement in comfort, and with more room for the conductor to pass along the gangway. The extra width entails an increase in weight to approximately 10 tons unladen or 14½ tons with seventy-two seated passengers; this is one ton more than normally allowed here. Because of the warmer climatic conditions in South Africa, drop windows are fitted throughout, and the upper halves are fitted with Purdah glass, thus providing plenty of ventilation and reducing glare from the sun. In other aspects the vehicles generally conform to the practice in this country. The driver's cab occupies the full width of the vehicle and the contactors are mounted therein on the nearside bulkhead.

One of the trolley-buses intended for South Africa but now in use in London

The control scheme gives limited regeneration with a 100-HP compound-wound motor, and includes six resistances and three field weakening steps. Rheostatic braking is available on the brake pedal. The lighting is supplied by a 24-V generator driven directly from the traction motor and charging eighteen alkaline cells of 120-Ah capacity, but battery manœuvring is not provided.

Newcastle-on-Tyne.—TROLLEY-BUSES.—In a report to the City Council the Transport and Electricity Committee states that 20 trolley-buses will be needed to convert the Elswick Road route. It is suggested that after the war £100,000 should be expended upon new trolley and petrol buses.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Electrical Switchgear & Associated Manufacturers, Ltd., reports that the profit of the operating company (Brookhirst Switchgear, Ltd.), for the year ended July 31st was £56,812, less £32,000 transferred to taxation reserve account, leaving £24,812. Of this, £9,750 has been paid as dividend, £1,388 reserved for cost of new A.R.P. shelters, £2,219 added to welfare fund, and £500 written off the expenditure on canteen extension and equipment. The balance carried forward is raised by £10,955 to £68,062. The profit of the holding company for the year to October 31st was £11,444, to which is added £10,609 brought in, making £22,053. The ordinary dividend for the year is 10 per cent. (actual), less tax, and £12,303 is carried forward. The report of the operating company states that the turnover for the year proved a record and to this all sections of its manufactures have contributed.

Strand Electric Holdings, Ltd., in its report to July 11th states that the net profit of the operating company (Strand Electric & Engineering Co., Ltd.), was £8,658, as compared with £5,737 for the previous year. After providing for taxation, £4,913, and transfer to capital reserve, £500, the profit available for dividend to the holding company is £3,245, equivalent to a gross dividend of £6,490, less tax. The dividend for the year is 4 per cent. less tax (against 2 per cent.), and £746 is carried forward (against £87 brought in). During the year the operating company, for economy, absorbed the business of Strand & Interchangeable Signs, one of its subsidiaries.

The Young Accumulator Co., Ltd., its subsidiary Associated Electric Vehicle Manufacturers, Ltd., and Crompton Parkinson, Ltd., announce that the terms of the merger having been ratified by the holders of the requisite majority of shares of both the Young Co. and A.E.V.M., the merger contracts have now become absolute.

The Chloride Electrical Storage Co., Ltd., is to pay an interim dividend of 5 per cent. (same) on both "A" and "B" ordinary stock.

Ensign Lamps, Ltd., have declared a final dividend of 15 per cent., maintaining the distribution for the year at 25 per cent.

Johnson & Phillips, Ltd., are maintaining their interim dividend at 7½ per cent.

The Madras Electric Supply Corporation, Ltd., is to pay an interim dividend of 1½ per cent., tax free (same).

Pye, Ltd., proposes to maintain the interim dividend on its 8 per cent. participating preferred ordinary stock at 5 per cent.

Burco., Ltd., is to pay a first and final dividend of 15 per cent., 2½ per cent. more than last year. The net profit at £22,016 is £9,208 more than in the preceding year.

Joseph Lucas, Ltd., have declared a final dividend of 12½ per cent. (same) on its ordinary shares, making 15 per cent. (same) for the year.

The Anglo-Portuguese Telephone Co., Ltd., is maintaining its interim dividend at 3 per cent.

The Cawnpore Electric Supply Co., Ltd., is maintaining its interim dividend at 3 per cent.

The Compania de Electricidad de la Provincia de Buenos Aires is to pay a dividend of 8 per cent. on its pre-preference shares (same).

New Companies

South Wales Switchgear, Ltd.—Private company. Registered November 10th. Capital, £10,000. Objects: To acquire the business carried on by Whitehead Switchgear and Inventions, Ltd., and for the purpose of adopting certain heads of agreement entered into between E. T. Granger, the receiver of the assets of the said company, and F. G. Penny, on behalf of this company, and to carry on the business of electrical and mechanical engineers, electricians, etc. Subscribers: F. W. Edmonds and C. F. Cooper, 18, Austin Friars, E.C.2. Solicitors: Slaughter and May, 18, Austin Friars, E.C.

Union Glen Manfg. Co., Ltd.—Private company. Registered in Edinburgh November 3rd. Capital, £3,000. Objects: To carry on the business of manufacturers of and dealers in wireless transmitting and receiving sets, etc. Directors: H. J. Edwards, 8, Golden Square, Aberdeen; J. G. Sellar, Littleway, Bieldside, Aberdeenshire; and H. S. Mackie, 10, Granville Place, Aberdeen. Registered office: Alliance House, 230, Union Street, Aberdeen.

Brooks Engineering Co., Ltd.—Private company. Registered November 5th. Capital, £1,000. Objects: To carry on the business of air conditioning, ventilating, heating, lighting, electrical, mechanical, horticultural, sanitary and general engineers, manufacturers of and dealers in dust collecting, dehydrating and pneumatic conveyor plants, unit heating systems, etc. Directors: E.D. Miller (chairman), Bembridge, Fitzroy Road, Fleet, Hants; and W. G. Brooks, 129, Vaughan Road, Harrow, Mdx. Registered office: 59, Great Portland Street, W.1.

West Cheshire Welding Co., Ltd.—Private company. Registered November 5th. Capital, £500. Objects: To carry on the business of electric and oxy-acetylene welders, demolition contractors, electricians, electrical, mechanical and radio engineers, etc. Directors: T. Hibbert, 34, Bispham Drive, Meols, Wirral; and C. Williams, West View, Padgate, Warrington.

Companies' Returns

Statements of Capital

Halifax & Bermudas Cable Co., Ltd.—Capital, £50,000 in 10,000 shares of £5 each. Return dated July 10th. All shares taken up. £50,000 considered as paid. Mortgages and charges: Nil.

Altrincham Electric Supply, Ltd.—Capital £310,000 in 100,000 ordinary, 49,650 1st preference and 103,350 2nd preference shares of £1 each, and 228,000 deferred shares of 5s. each. Return dated July 2nd. 100,000 ordinary, 45,000 1st preference, 63,350 2nd preference and

228,000 deferred shares taken up. £155,350 paid. £110,000 considered as paid. Mortgages and charges: £40,000.

Stokes Appliances, Ltd.—Capital, £5,000 in £1 shares. Return dated May 28th (filed June 3rd). 403 shares taken up. £403 paid. Mortgages and charges: Nil.

Bude Electric Supply Co., Ltd.—Capital, £30,000 in 30,000 ordinary shares of £1 each. Return dated June 5th. All shares taken up. £30,000 paid. Mortgages and charges: £2,500.

Horace Grensted, Ltd.—Capital, £2,000 in £1 shares. Return dated June 18th. 1,500 shares taken up. £1,000 paid. £500 considered as paid. Mortgages and charges: Nil.

W. E. Dove & Co., Ltd.—Capital, £3,500 in £10 shares. Return dated June 19th. 320 shares taken up. £2,000 paid. £1,200 considered as paid. Mortgages and charges: £3,800.

Ozonair, Ltd.—Capital, £40,000 in 77,600 preference and 322,400 ordinary shares of 2s. Return dated May 5th (filed June 23rd). 77,600 preference and 80,520 ordinary shares taken up. £4,252 paid on 42,520 ordinary shares. £11,560 considered as paid on 38,000 ordinary and 77,600 preference shares. Mortgages and charges: Nil.

J. Stone & Co., Ltd.—Capital, £1,200,400 in 600,000 preference and 600,400 ordinary shares of £1 each. Return dated June 24th. All shares taken up. £1,200,400 paid. Mortgages and charges: Nil.

Long Eaton Cable Co., Ltd.—Capital, £3,000 in 3,000 shares of £1 each. Return dated June 26th. All shares taken up. £3,000 paid. Mortgages and charges: £50,000.

Domestic Electrification, Ltd.—Capital, £50,000 in £1 shares. Return dated July 8th. 40,000 shares taken up. £40,000 paid. Mortgages and charges: Nil.

East Devon Electricity Co., Ltd.—Capital, £350,000 in £1 shares. Return dated July 10th. All shares taken up. £315,000 paid. £35,000 considered as paid. Mortgages and charges: Nil.

Increases of Capital

Keswick Electric Light Co., Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 ordinary shares beyond the registered capital of £20,000. To June 19th, 1941, 15,000 ordinary and 4,000 preference shares of £1 had been issued and fully paid up, of which the Windermere & District Electricity Supply Co., Ltd., held 14,500 ordinary and 4,000 preference shares.

Bushing Co., Ltd.—The nominal capital has been increased by the addition of £40,000 in £1 ordinary shares beyond the registered capital of £60,000. To October 15th, 1941, 60,000 shares had been issued, of which the General Electric Co., Ltd., held 29,800 shares and A. Reyrolle & Co., Ltd., held 29,799 shares.

J. D. Jones & Co. (London), Ltd.—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares, beyond the registered capital of £1,000.

Mortgages and Charges

Underwood (Electric), Ltd.—Assignment on October 22nd, 1941, of proceeds of certain contracts, to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £5,200 at any time.

L. Sterne & Co., Ltd.—Satisfaction in full on June 30th, 1941, of debenture dated June 28th, 1934, and registered July 9th, 1934, securing £30,000. (Notice filed November 1st, 1941).

Barrett & Wright, Ltd.—Satisfaction to the extent of £1,000 on October 1st, 1941, of Land Registry Charge dated December 8th, 1924, and registered April 8th, 1932. (According to the register of mortgages the Land Registry Charge registered April 8th, 1932, showed £1,000 outstanding at August 11th, 1930).

J. G. Smithson & Co., Ltd.—Mortgage on all moneys due to the company from the Ministry of Supply, dated October 30th, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £1,200.

Receiver Released

L. H. Farmiloe, Ltd.—C. Green, 46, Singleton Road, Kersal, Salford 7, ceased to act as receiver and manager on October 30th.

Liquidations

Neron Lamps, Ltd.—Winding up voluntarily. Liquidator, Mr. R. Adams, of George A. Touche & Co., Basildon House, London, E.C.2.

Commander Radio & Television Co., Ltd.—Meeting, December 17th at 101, Station Road, Edgware, for the purpose of hearing an account of the winding up by the liquidator, Mr. F. R. Cooper.

Robins (Radio), Ltd.—Meeting December 22nd at 20, Terrace Road, Swansea, to receive an account of the winding-up by the liquidator.

Bankruptcies

G. A. Weston, electrical contractor and engineer, Crutched Friars, E.C.—This debtor attended before Mr. Registrar Parton at the London Bankruptcy Court on November 11th for public examination upon accounts showing total liabilities of £1,553 (unsecured £996) and net assets of £550, after allowing £51 for payment of the preferential claims. Debtor stated that he had carried on business as an electrical engineer for twenty-seven years and since 1934 also as an electrical contractor. In April last his stock was seriously damaged by enemy action. The failure was further attributed to loss of business with a County Council and inability to secure fresh contracts. The examination was concluded.

N. Hall, wholesale and retail radio dealer, trading as Hall & Co., 66, Margaret Street, Ashton-under-Lyne, and as Horners, 278, Stamford Street, Ashton-under-Lyne.—Discharge suspended for two years until October 10th, 1943.

H. Stansfield, electrician, 25, Sunnydale Park, Ossett, and lately carrying on business at 7, Station Road, Ossett.—Trustee, Mr. E. T. Sanders, Official Receiver, Hallfield Chambers, 71, Manningham Lane, Bradford, released November 4th.

W. F. Clipson, radio retailer and engineer, trading as E. Clark & Co., 48, High Street, Burton Latimer. — Trustee, Mr. T. Pollitt, Official Receiver, 6, The Parade, Northampton, released November 4th.

STOCKS AND SHARES

TUESDAY EVENING.

THE general trend of Stock Exchange markets is upwards. At one time last week the prospect of widely-spread industrial trouble in United States had the effect of laying a definite check upon investment and speculation alike; for, if American labour suspended operations even for a short time, this might have meant a slowing down of production of war material for the Allies' use. The victory of Mr. Roosevelt, however, in amending the Neutrality Act served to relieve the temporary tension that had been caused. It led to a recovery of prices which previously were inclined to be a little disturbed by the industrial outlook in the States.

To Sell or Not to Sell

The holder of gilt-edged securities such as those of the Central Electricity Board, the senior stocks of the London Passenger Transport Board and the prior-charge issues of the Southern and other Home railway companies, is at something of a loss to know whether to take advantage of to-day's high prices by selling these stocks in order to reinvest the money in national war securities. If he sells, it must be to someone who is prepared to buy the stocks and who, consequently, would be unable to use the purchase-price for subscription to National War Bonds. On the other hand, to-day's prices are so high that they offer temptation to the holder of the stocks to let these go, and to replace them with others in which a possible depreciation of capital is not so likely to occur.

The opinion in the Stock Exchange markets is that during the period of the war, the Government will keep so tight a hold upon the money market as to ensure maintenance of high prices for purely gilt-edged securities. What is going to happen after the war, nobody can tell.

Price Fluctuations

Callender's have more than recovered their slight decline of last week, and at 75s. show a gain of 2s. 6d. At this price the return on the money, taking the 15 per cent. dividend as the basis of calculation, is 4 per cent. A rise of 2s. 6d. has also occurred in Joseph Lucas, raising the price to 62s. 6d. and a florin advance in Falk Stadelmann at 19s. 6d., is due to recognition of the high yield which these shares were previously returning. Revo ordinary at 25s. 7½d. are 7½d. better for a similar reason. Radio and kindred companies' shares remain in request. E.M.I. have hardened to 13s. 6d. E. K. Cole at 9s. 6d. are 6d. higher and there has been an all-round improvement in shares of companies connected with the industry.

Tube Investments, after their 5s. fall to 87s. 6d., are now quoted at that price ex dividend of 2s., equal, of course, to 1s. per share net. Henley's at 22s. 6d. ex dividend, are left unchanged. Crompton Parkinsons remain at 20s. It is announced that the Crompton Parkinson merger with the Young Accumulator Co. has now been ratified. Laurence Scott 5s. shares are a good market at 11s., attention being drawn to the shares by the satisfactory yield of 6½ guineas which that price permits on the last-paid dividends of 15 per cent. Chloride Electrical Storage, which stand at 70s., are unaffected by the announcement of the usual interim dividends of 5 per cent. on the "A" and "B" ordinary. On both these shares the dividend for last year was made up to 15 per cent.

Johnson & Phillips

Maintenance of the previously-paid interim dividend of 7½ per cent. less tax on Johnson & Phillips ordinary shares, has left the price unchanged at 55s., which, by the way, is nearly the highest touched during the past decade. In 1936 Johnson & Phillips went to 55s. 6d., comparing with the lowest in the past ten years of 13s. 9d. in 1932, when the dividend was 5½ per cent. The company's year ends with December. For 1939 and 1940 the dividends were 15 per cent. per annum, and at the present price of 55s. the yield comes to practically 5½ per cent. on the money. How taxation has advanced within the ten year period is seen in the amount of £3,787 paid in taxes in 1932, against £260,000 for 1940. Of the authorised capital of a million pounds in shares of £1 each, 800,000 have been issued. There is usually a free market in the shares, but, like many others in the same category, they have become increasingly difficult to buy owing to persistent absorption by the investor of whatever shares come to market.

"No Stock"

Orders to buy 2,000 shares of this and 3,000 of the other company have to be returned, simply because dealers in the market admit that already they find great difficulty in supplying what they have sold previously, and that they are frankly afraid to sell any further substantial quantity owing to the trouble they have in buying the shares back. Prices go up steadily week by week. For several weeks past, the majority of changes in the quotations given in our price lists have been upwards, but although prices are advanced, this has little or no effect in bringing shares to the market. In fact it almost seems as though the higher the prices go, the more determined are the holders of the shares to retain their interests.

War Damage Liability

Interest has been aroused in many investment circles by a novel suggestion that has arisen out of the question of who shall pay for war

(*Concluded on page* 587)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Nov. 19	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	15	12½	52/6	..	4 15 5
British Power and Light	7	6	26/-	..	4 12 4
City of London	7½	7	25/9	..	5 8 9
Clyde Valley	8	8	37/6	..	4 5 4
County of London	10½	8	35/-	..	4 11 5
Edmundson's:					
7% Pref.	7	7	32/6	..	4 6 2
Ord.	6	6	27/6	—6d.	4 7 3
Elec. Dis. Yorkshire	9	9	41/3	..	4 7 3
Elec. Fin. and Securities	12½	12½	43/9	..	5 14 2
Elec. Supply Corporation	11½	10	43/9	..	4 11 4
Isle of Thanet	2	Nil	9/-	..	—
Lancs Light and Power	7½	7½	33/9	..	4 9 0
Llanelly Elec.	5½	5½	21/6	..	5 2 4
Lond. Assoc. Electric	5½	4½	18/9	..	4 16 0
London Electric	7	7	24/6	..	5 14 3
London Power Deb. Red.	5	5	104	..	4 16 2
Metropolitan	10	8	36/3	..	4 8 5
Midland Counties	8	8	37/6	..	4 5 4
Mid. Elec. Power	9	9	38/9	..	4 13 0
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	29/6	..	4 15 0
7% Pref.	7	7	32/6	..	4 6 2
Northampton	10	10	44/6	..	4 10 0
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/-	..	4 0 0
6% Pref.	6	6	29/6	..	4 1 4
Richmond Elec.	6	6	22/6	..	5 6 8
Scottish Power	8	8	38/3	..	4 3 4
Southern Areas	5	5	18/3	..	5 9 7
South London	7	7	23/6	..	5 19 2
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	19/6	..	4 12 4
Yorkshire Elec.	8	8	39/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/-	+1/-	—
Calcutta Elec.	8*	7*	37/-	..	—
Cawnpore Elec.	10	10	28/9	..	6 19 0
East African Power	7	7	27/-	..	5 3 8
Jerusalem Elec.	7	5	17/6	..	5 14 3
Kalgoorlie (10/-)	7½	7½	13/-xd	..	5 15 5
Madras Elec.	6*	4*	22/6	..	3 11 1
Montreal Power	1½	1½	25½	..	5 13 2
Palestine Elec "A"	Nil	Nil	17/6	..	—
Perak Hydro-elec.	2½	6	18/9	..	6 8 0
Shawinigan Power	83cts.	90cts.	15½	—1	—
Tokyo Elec. 6%	6	6	30½	..	19 13 6
Victoria Falls Power	15	15	80/-	+⅛	3 15 0
Whitehall Inv. Pref.	7½	7½	15/-	..	10 0 0
Public Boards					
Central Electricity:					
1950–70	5	5	110	..	4 11 1
1955–75	5	5	114	..	4 7 9
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	101	..	3 9 4
1974–94	3½	3½	96	..	3 7 9
London Elec. Trans. Ltd.	2½	2½	96½	..	2 11 10
London & Home Counties 1955–75	4½	4½	108	..	4 3 4
Lond. Pass. Trans.:					
A	4½	4½	117½	..	3 16 8
B	5	5	116½	..	4 5 10
C	1½	3	41	+1	7 6 4
West Midlands J.E.A. 1948–68	5	5	108½	..	4 12 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	106½	..	5 12 9
Def.	1½	1½	24½	..	6 2 5
Anglo-Portuguese	8	8	15/-	..	10 13 4
Cable & Wireless:					
5½% Pref.	5½	5½	105	..	5 4 10
Ord.	4	4	68	+½	5 16 0
Canadian Marconi $1	Nil	4cts.	5/3	+3d.	3 4 6
Globe Tel. & Tel.:					
Ord.	8½*	8½*	30/-	..	—
Pref.	6	6	28/9	..	4 3 6
Great Northern Tel.: (£10)	20	20	14½	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	27/6	..	5 9 1
Oriental Tel. Ord.	11½*	16	76/3	+⅛	4 4 0
Telephone Props.	6	6	11/3	..	10 13 4
Tele. Rentals (5/-)	10	10	8/9	..	5 14 3
Traction and Transport					
Anglo. Arg. Trams:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	6½	..	—
Brit. Elec. Traction:					
Def. Ord.	45	45	900xd	+30	5 0 0
Pref. Ord.	8	8	170xd	+2	4 14 2
Bristol Trams	8*	8	42/6	..	3 15 4
Brazil Traction	$1	50c.	12½	+½	—
Calcutta Trams	8	5½	22/-xd	..	5 0 0
Cape Elec. Trams.	5	5	20/-	..	5 0 0
Lancs Transport	10	10	42/6	..	4 14 1
Mexican Light:					
1st Bonds	5	5	65	..	—
Rio 5% Bonds	5	5	92½	..	5 8 3
Southern Rly.:					
5% Prefd.	5	5	61½	..	8 2 8
5% Pref.	5	5	102½	+1	4 17 6
T. Tilling	10	10	46/3	..	4 6 7
Tilling & B.A.	8*	7*	52/6	..	2 13 4
West Riding	10	10	39/-	..	5 2 7

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Nov. 19	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord. ..	Nil	7½	22/–	..	6 16 4
Assoc. Elec.:					
Ord.	10	10	43/9	..	4 16 3
Pref.	8	8	38/9	..	4 2 4
Automatic Tel. & El.	12½	12½	48/9	..	5 2 6
Babcock & Wilcox	11	11	45/–	..	4 17 9
British Aluminium	12½	10	43/9	..	4 11 4
British Insul. Ord...	20	20	91/3	..	4 7 9
British Thermostat (5/–)	18½	18½	13/9	..	6 14 6
British Vac. Cleaner (5/–)	12½	10	12/6	..	4 0 0
Brush Ord... ..	Nil	Nil	4/6	..	—
Callender's ..	15	15	75/–	+½	4 0 0
Chloride Elec. Storage	15	15	70/–	..	4 5 9
Consolidated Signal	17	17	75/–	..	4 10 10
Crabtree (10/–) ..	17½	17½	28/3	..	6 4 0
Crompton Parkinson Ord. (5/–) ..	30	20	20/–	..	5 0 0
E. K. Cole (5/–) ..	10	Nil	9/6	+6d.	—
E.M.I. (10/–) ..	Nil	6	13/6	+3d.	4 9 0
Electric Construction	10½	10	32/6	..	6 3 0
Enfield Cable Ord.	16½	12½	53/9	..	4 13 0
Elecl. Switchgear (10/–)	16	10	20/–	..	5 0 0
English Electric ..	10	10	36/3	..	5 10 4
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)	25*	22*	40/–	..	2 15 0
Ever Ready (5/–) ..	40	40	29/3	..	6 16 6
Falk Stadelmann ..	7	7½	19/6	+2/–	7 13 10
Ferranti Pref. ..	7	7	26/3	..	5 6 10
G.E.C.:					
Pref.	6½	6½	32/6	..	4 0 0
Ord	20	17½	77/6	..	4 10 2
Greenwood & Batley	15	13	25/–	..	10 8 0
Hall Telephone (10/–)	15	10	15/–	..	6 13 4
Henley's (5/–) ..	20	20	22/6xd	..	4 9 1
4½% Pref. ..	4½	4½	21/3	..	4 4 8
Hopkinsons ..	15	15	45/–	..	6 13 4
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion ..	32½	30	105/–	..	5 14 3
J. Lucas	15	15	62/6	+½	4 16 0
Johnson & Phillips	15	15	55/–	..	5 9 1
Lancashire Dynamo	20	20	62/6	..	6 8 0
Laurence, Scott (5/–)	15	15	11/–	..	6 16 4
London Elec. Wire	7½	7½	25/–	..	6 0 0
Mather & Platt ..	12½	10	42/6	..	4 14 1
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	91/3	..	4 7 9
Pye Deferred (5/–)..	25	25	13/9	..	9 1 10
Revo (10/–) ..	5	20	25/7½	+ 1/32	7 16 0
Reyrolle	12½	12½	56/3	..	4 9 0
Siemens Ord. ..	7½	7½	25/–	..	6 0 0
Strand Elec. (5/–)..	4	2	3/6	..	2 17 1
S. Smith (4/–) ..	37½	50	7/–	..	7 2 10
Switchgear & Cowans (5/–) ..	10	15	10/–	..	7 10 0
Tel. Condenser (10/–)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	41/3	..	4 17 0
Telephone Mfg. (5/–)	9	9	8/3	..	5 9 1
Tube Investments .	23¾	20	87/6xd	+1/–	4 11 4
Vactric (5/–) ..	4	Nil	3/6	..	—
Vickers (10/–) ..	10	10	17/6	..	5 14 5
Ward & Goldstone (5/–)	20	20	17/6	..	5 14 3
Westinghouse Brake	17½	10	47/6	..	4 4 4
Walsall Conduits (4/-)	55	55	31/3	..	7 0 9
West, Allen (5/–) ..	7½	7½	5/–	..	7 10 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page 585*)

damage. It is so much taken for granted that liability on this account will be fastened upon the shoulders of holders of ordinary stocks and shares, that any suggestion of fixing the liability upon other classes of stock is regarded as being at least unorthodox, if not heterodox. The holders of ordinary stocks argue, however, that the security of prior-charge issues is as much affected by possible enemy action as is the earning capacity of a railway or industrial company in respect of its ordinary stock proprietors. How the liability may be spread, over say debenture, preference, guaranteed and rent charge stocks, in addition to the ordinary issue, is a matter that has not yet been worked out. It cannot be said to have had any definite influence over prices, but the mere raising of the point carries no little interest for proprietors of senior securities in Home railway and industrial undertakings.

Railway and Traction

London Passenger Transport "C" stock at 41 is a point to the good, and the pre-ordinary stocks of the Board, as well as those of the Central Electricity Board, retain their pronounced strength.

A net rise of 30 points in British Electric Traction deferred ordinary to 900 ex dividend, means that the return on the stock at the present rate of 45 per cent. dividend, is a level 5 per cent. The preferred ordinary stock at 170 is ex the dividend of £2 actual. Southern Railway preference at 102½ is a point higher, there being a good deal of investment money going into a stock which, by comparison with others of similar class, is not unduly high.

In the foreign list, Brazilian Tractions at 12½ are the fraction to the good, lively demand from across the Atlantic being the mainspring of the movement. Brazilian finance is gradually getting into a position which commands respect. Indeed, the credit of South American stocks and shares has been substantially buttressed during the past two or three weeks by the new trade agreements reached between this country and several of the South American States; an agreement assisted materially by United States political developments. Atlas Electrics have gained 1s. at 4s., an increase of 33 per cent. on the week. A rise of 3/16 lifted Oriental Telephones to 76s. 3d.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

31481. "Expansion turbines for low-temperature plants." P. Kapitza. October 31st, 1938. (540555.)

1939

11949. "Heating and cooling of buildings." J. T. C. Van Dooren and Naamlooze Vennootschap Stralingswarmte. April 20th, 1939. (540678.)

30066. "Electric primers and detonators for ammunition cartridges, torpedoes, mines and the like." V. G. Bull. November 8th, 1940. (540559.)

1940

3474. "Electron multipliers." F. J. G. Van den Bosch and Vacuum-Science Products, Ltd. February 23rd, 1940. (Cognate application, 3864/41.) (540640.)

4604. "Radio direction-finding equipments." Standard Telephones & Cables, Ltd., and C. W. Earp. March 12th, 1940. (540681.)

6598. "Resistance welding machines." A. Reyrolle & Co., Ltd., and J. W. Bayles. April 11th, 1940. (540722.)

6888. "Illuminating devices." G. V. Downer. April 17th, 1940. (540607.)

6911. "Dynamo-electric machines." Westinghouse Electric International Co. April 18th, 1939. (540573.)

7001. "Friction couplings for use in spring housings. Landis & Gyr Soc. Anon. February 15th, 1940. (540574.)

7002. "Multiple-pole switches." Landis & Gyr Soc. Anon. February 15th, 1940. (540529.)

7096. "Electrical measuring apparatus." Standard Telephones & Cables, Ltd., and B. Secker. April 19th, 1940. (540579.)

7120. "Air compressors." Broom & Wade, Ltd., and H. S. Broom. April 19th, 1940. (540580.)

7263. "Moving-coil electrical measuring instruments." Elliott Bros. (London), Ltd., and D. C. Harben. April 22nd, 1940. (540620.)

7313. "Electric signalling systems." Standard Telephones & Cables, Ltd., and L. P. Lowry. April 23rd, 1940. (540649.)

7395. "Method of, and means for, connecting arc-welding circuits to workpieces." H. Sommer. May 12th, 1939. (540690).

7399. "Coin-freed meter mechanism." British Electric Meters, Ltd., N. B. Coop and B. T. E. Watkins. April 24th, 1940. (540691.)

7400. "Coin-freed prepayment mechanism." British Electric Meters, Ltd., N. B. Coop and B. T. E. Watkins. April 24th, 1940. (540692.)

7658. "Microphones." Marconi's Wireless Telegraph Co., Ltd. April 29th, 1939. (540585.)

7753. "Thermal-responsive electric switches." British Thomson-Houston Co., Ltd., W. J. Sims and J. H. Fella. April 30th, 1940. (540621.)

8212. "Dynamo-electric machines." Mawdsleys, Ltd., and N. W. Jones. May 7th, 1940. (540586.)

9001. "Holders for double-ended tubular electric-discharge lamps." British Thomson-Houston Co., Ltd., and J. Bertram. May 21st, 1940. (540694.)

9081. "Screw-and-nut gearing, more particularly for operating electric regulators." General Electric Co., Ltd., and L. M. Jones. May 22nd, 1940. (540622.)

10624. "Television receivers." Hazeltine Corporation. February 7th, 1940. (540590.)

10767. "Electric storage batteries." Varley Dry Accumulators, Ltd., and J. A. Szper. June 22nd, 1940. (540591.)

11830. "Negative feedback amplifier." Standard Telephones & Cables, Ltd. October 12th, 1939. (540630.)

12503/12504. "Electric motor control systems." British Thomson-Houston Co., Ltd., H. V. Benns and J. P. Gregory. August 2nd, 1940. (540632/540633.)

12982. "Ceramics and their manufacture." General Electric Co., Ltd., J. H. Partridge and M. Pirani. August 14th, 1940. (540543.)

13300. "Compressed air intensifiers." E.M.B. Co., Ltd., and G. N. Cadbury. August 21st, 1940. (Addition to 534282.) (540655.)

13615. "Electric signalling systems." Siemens Bros. & Co., Ltd., and M. Reed. August 29th, 1940. (540659.)

13892. "Generation and transmission of high-frequency currents." E. Hallowell, Northern Utilities Trust, Ltd., and Automatic Telephone & Electric Co., Ltd. September 5th, 1940. (Addition to 478314.) (540706.)

14333. "Core structures for induction apparatus." Westinghouse Electric International Co. September 20th, 1939. (540662.)

14488. "Combined tripod stands and protective covers for field instruments." Marconi's Wireless Telegraph Co., Ltd., and F. M. Wright. September 23rd, 1940. (540544.)

14709. "Non-dazzle headlamps." British Thomson-Houston Co., Ltd. September 28th, 1939. (Addition to 539135.) (540664.)

14858. "Method and apparatus for casting permanent-magnets." British Thomson-Houston Co., Ltd. October 4th, 1939. (540708.)

16241. "Control arrangements for direct-current electric motors." British Thomson-Houston Co., Ltd. (Tokyo Shibaura Denki Kabushiki Kaisha.) November 8th, 1940. (540547.)

17722. "Protective circuit arrangements and devices for three-phase electric motors." J. B. Scott. December 16th, 1940. (540669.)

17845. "Electric lighting system." British Thomson-Houston Co., Ltd. December 18th, 1939. (540670.)

1941

4653. "Copper cobalt tin alloys." British Thomson-Houston Co., Ltd. April 12th, 1940. (540715.)

8148. "Method of and means for manufacturing magnetic coils for reflecting cathode rays and similar purposes." Jefferson Electric Co. June 2nd, 1939. (Divided out of 539122.) (540554.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — SYDNEY COUNTY COUNCIL.—December 18th. High- and low-voltage cables for the Bunnerong power station. Specification 560.

January 29th. Steam and feed water piping for No. 10 turbo-alternator for the Bunnerong power station. Specification 559.

Belfast.—November 24th. Electricity Department. Arc rectifier, AC motors and wiring, 6.6-kV switchgear, 33-kV cables and static transformer. (October 31st.)

South Africa.—POST OFFICE.—December 4th. Equipment for radio-telephone link between Maseru and Mokhotlong. (October 24th.)

DURBAN.—January 16th, 1942. City Council. Potential and current transformers. Contract E.2038.

JOHANNESBURG.—December 27th. City Council. Low-voltage metal-clad switchboards. Contract 883. Oil-immersed circuit-breakers. Contract 884.

Orders Placed

Glasgow.—Water Committee. Accepted. Installation of electric lighting in the valve chambers at Milngavie Reservoirs (£48).—Andrew Ritchie.

Municipal Transport Committee. Accepted. Cable (£3,379).—Scottish Cables, Ltd.

Newcastle-on-Tyne. — Transport and Electricity Committee. Accepted. Twenty trolley-bus chassis.—Karrier Motors, Ltd. The vehicles are for post-war delivery.

Salford.—Corporation. Accepted. Electric baling press (£220).—F. Tonge & Son, Ltd.

Lighting Committee. Accepted. Three-phase bank of reactors (£530).—Metropolitan-Vickers Electrical Co., Ltd.

Wakefield.—Education Committee. Accepted. Electrical work at Technical College (£75).—H. Smith.

Watford.—Electricity Committee. Accepted. Transformers: Nine (£1,170).—Brush Electrical Engineering Co., Ltd.; four (£1,381).—Metropolitan-Vickers Electrical Co., Ltd.; one (£260).—Crompton Parkinson, Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnard Castle.—Hostel at Ingleton; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Bilston.—Canteens at Stonefield and Etheridge schools (£5,605), and day nursery at rear of public library; borough engineer.

Blackburn.—Hostels; W. Pickstone, borough surveyor, Town Hall, Blackburn.

Blackpool. — Shelters (£120,000); borough engineer.

Blaydon-on-Tyne.—Restaurant at Chopwell (£600); U.D.C. surveyor.

Bolton.—Works additions; T. Caldwell & Son. Works additions; W. Wadsworth & Sons, Ltd.

Bradford.—School shelter works (£46,900); city engineer.

Cheetham.—Works extensions; J. G. MacBeath, architect, 2, Montague Road, Sale, Cheshire.

Chelmsford.—Infants' school on Patching Hall Lane estate; V. J. Willis, borough engineer, Municipal Offices, Duke Street.

Cheshire.—Junior School, Alsager; E. M. Parkes, county architect, The Castle, Chester.

Chesterfield. — Alterations to Walton Sanatorium for Derbyshire C.C. (£5,000); J. Harrison, county architect, St. Mary's Gate, Derby.

Clayton.—Re-building works; A. J. Freeman, architect, 33, Barwell Road, Sale, Cheshire.

Coventry.—Shelters (255) which can be converted into permanent houses or bungalows when the war is over; City Shelter Committee.

Rebuilding ground floor of central premises, Smithfield Street; Coventry and District Co-operative Society, Ltd., West Orchard.

Cleansing unit and decontamination station, Foleshill; D. E. E. Gibson, city architect, 1A, Warwick Row.

Durham.—Community feeding centres at Framwellgate Moor and Sherburn; S. Dodds, R.D.C. surveyor.

Mortuary at Holywood Hall Sanatorium (£1,700); county surveyor, 43, Old Elvet, Durham.

Guildford.—Erection of control centre (£975); borough engineer, Municipal Offices, High Street.

Hastings.—Additions, for Stewarts, Ltd.; Callow & Callow, architects.

Hull.—Police boxes and shelters (£19,946), and accommodation, Cottingham and Sutton hospitals (£8,300); city engineer.

Hyde.—School canteen (£2,578); borough engineer.

Kettering.—Works canteen; Whitfield, Hodgsons & Brough, Ltd., Lawson Street.

Leek.—Canteen, Nelson Street; W. Stannard & Co., Ltd.

Llanelly.—Equipping Prospect Place central kitchen (£1,129); borough engineer, Town Hall.

Liverpool.—School on site of St. Giles' church Hall, Aintree, and school hutments, Huyton; A. Evans, county architect, County Offices, Preston.

Lowestoft.—Restaurant, Crown Street (£1,100); borough engineer.

Manchester.—Alternative police accommodation (£7,536), and restaurant, Harpurhey (£1,205); city engineer.

Reconstruction of works buildings, Ardwick;

D. Moseley & Sons, Ltd., Chapelfield Rubber Works, Ardwick.

Pump house, etc.; J. Carr & Sons, Ltd., Clarence Mills, Chester Road.

Newbury.—School hutments and canteens; borough engineer.

New Malden.—Structural alterations at Alric House, Coombe Road, for British Restaurant; borough engineer, Municipal Offices, New Malden.

Newcastle-on-Tyne.—Additions to British Restaurant at Barras Bridge for the City Council (£3,000); J. & W. Lowry, builders, Corporation Street.

Shelters at Elswick Grange Institution for the City Council (£1,050); Elliott Bros., builders, Otterburn Terrace.

Northumberland.—Schools, Amble and Shiremoor; W. W. Tasker, county architect, Council offices, Mitford Road, Morpeth.

Oldham.—Canteen; Orb Cotton Spinning Co., Ltd.

Rothwell.—Canteen, Rothwell Haigh; J. & J. Charlesworth, Ltd., Milnes House, Wakefield.

Smethwick.—Canteen, etc., Cape Hill; Mansell Boorth & Co., Ltd.

South Shields.—Restaurant at the Seamen's Mission.

Stalybridge.—Offices extensions; R. J. Coley & Son (Hounslow), Ltd., Chapel Road, Hounslow.

Sunderland.—Canteen, for S. P. Austin & Sons.

Two canteens for engineering works; L. J. Couves & Partners, architects, 2, Westfield Avenue, Gosforth, Northumberland.

Extensions to the canteen for Doxford & Sons, Ltd.; D. & J. Ranken, Stockton Road.

Shelters at The Avenue; borough engineer.

Hutments, Plains Farm School, for the Education Committee.

Surrey.—Canteen for school meals (£18,500); county architect, Kingston-on-Thames.

Walsall.—Adapting premises as British Restaurants at Pleck, Bloxwich, and The Butts; M. E. Haberson, borough surveyor, The Council House.

Warwickshire.—Additions to hospitals at Alcester, Solihull and Nuneaton; county architect, Warwick.

West Gorton.—Canteen; W. E. E. Anderson, architect, 12, Imperial Square, Cheltenham, Glos.

Worcester Park.—Adaptation of four empty shops, Central Road, as British Restaurants; borough surveyor, Sutton and Cheam Municipal Offices, 78, High Street, Sutton, Surrey.

Yorkshire.—Canteen at Guisborough Grammar School; county architect, County Hall, Northallerton.

Electrical Manufacture in China

THE economic plans of the Chinese Government have included incursions into the field of electrical manufacture. Cables, lamps, transformers, small motors and dynamos, starters, switchgear, batteries and insulators are within the capacity of plants which have been established in the new industrial territory in the interior to which many factory enterprises, formerly flourishing in areas now virtually controlled by the Japanese, have been transferred. Shanghai possessed eight works where electric motors were made.

Exports of electrical equipment from China last year totalled $17,200,000 in value, or three times that in 1939. More than half these exports consisted of lamps and lampware, the value of which showed an increase from $1,981,000 in 1939 to $9,961,000 in 1940. In the latter total the chief items were :—

	$(000)
Lamp bulbs—	
Total	3,178
To India	347
,, Indo-China	187
,, United Kingdom	172
,, Hong Kong	753
,, Philippines	464
,, United States	713
Bulbs for flashlights—	
Total	4,687
To United Kingdom	1,752
,, Netherlands E. Indies	526
,, Malaya	506
,, Thailand	520
,, United States	923

For the first time in the records of China's export trade new headings have been included for a number of the smaller electrical goods now being made there. Values and principal destinations in 1940 were as follows :—

	$(000)
Fans, toasters, irons, etc.—	
Total	1,572
To Indo-China	129
,, Hong Kong	685
,, Netherlands E. Indies	133
,, Thailand	427
Electrical accessories of porcelain—	
Total	181
To Hong Kong	99
,, Thailand	48
Ditto of plastics—	
Total	1,089
To Brazil	341
,, India	125
,, Hong Kong	244
,, Mexico	140
Insulated wire and cable—	
Total	225
To Thailand	114
,, Hong Kong	26
Batteries and accumulators—	
Total	1,391
To Burma	236
,, Hong Kong	602
Radio sets and parts—	
Total	160
To Hong Kong	66
,, Thailand	80
Electrical appliances, complete, n.o.r.—	215
To United States	68
,, Netherlands E. Indies	30
,, Malaya	23

In addition, there were exported electrical materials and fittings of metal, not otherwise recorded, to the value of $1,668,000 in 1940, compared with $1,200,000 in 1939, mainly to Hong Kong, but with Indo-China and Thailand also fair customers. The average equivalent of the Chinese standard dollar in 1940 was 14¼d.